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The AUTOMOBILE

How Weight Distribution Affects Skidding

Heavy Rear Less Liable To Skid But More Dangerous—Braking and Acceleration Must Be Gradual

By the Late E. P. Batzell

THE most desirable distribution of weight in an automobile is an interesting problem. Much guessing could be attached to it and the only way to obtain much valuable information would be to appeal to all interested for their views.

Although it looks simple at first, the problem involved cannot be disposed of lightly, for instance, by stating the requirement of a center of gravity, located above the ground and near it. The advantages connected with proper weight distribution are far too great for that, because here is concerned not merely the running of the car on the road, but the ability of the car to keep to its given and desired direction.

Little Attention for Weight

As a general rule the designer brings out a car with insufficient attention given to the matter of weight distribution, locating parts and accessories according to his judgment and the space available. Then the car is tried on the road and sometimes it will be satisfactory, and in other instances it might have many defects, such as easy skidding, a tendency to leave the road at certain speed, hard steering, etc. Considering that these defects can be largely due to incorrect weight distribution, this at once brings into prominence the problem mentioned. The fact that there are cars which perform very well and others which leave many things to be desired in this respect proves that a proper handling and analysis of the situation might enable everybody to enjoy the stable type of automobile.

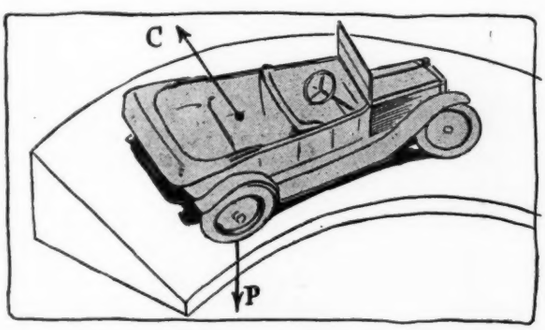

Fig. 1—In turning to the right on a road surface which is inclined so that the inner rear wheel receives a greater part of the load, P, there will be no danger of skidding in accelerating, despite the uneven traction on the two rear wheels, because the centrifugal force, C, tends to equalize the load on the wheels

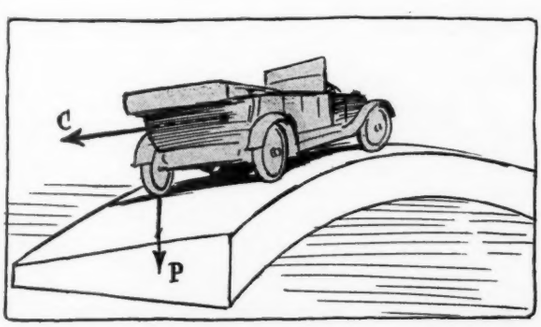

Fig. 2—But in turning where the outer wheel is lower than the inner the situation is extremely unstable, because the centrifugal force, C, in addition to the force of gravity, assists outward skidding

In view of the fact that the biggest value of the discussion is attached to the performance of cars when running no reference will be made to their stability when standing.

For the sake of simplicity it is assumed that the center of gravity in various cases is located in the middle plane of the automobile, that is, the vertical plane which passes through the middle of the front and rear axles when the car stands on level ground. To simplify matters further no reference will be made to the overturning of cars when running, this being governed by conditions which are obviously more or less understood. *Chief interest is concentrated on the skidding of the car.*

This phenomenon is to be con-

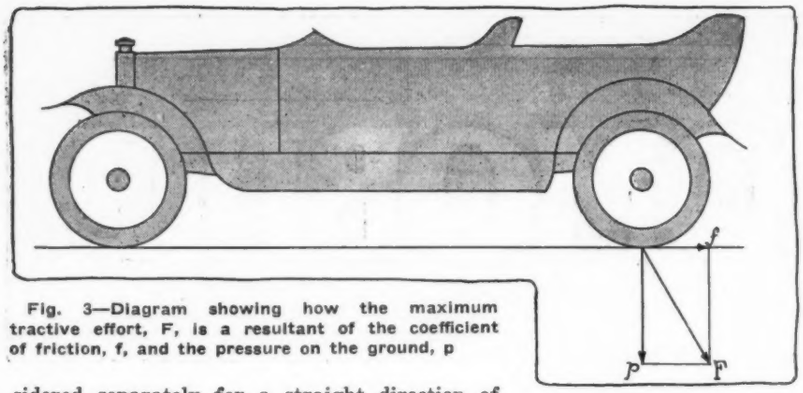

Fig. 3—Diagram showing how the maximum tractive effort, F, is a resultant of the coefficient of friction, f, and the pressure on the ground, p

sidered separately for a straight direction of travel, for passing on curves and for level and sidewise inclined roads.

Skidding Defined

The term skidding as used here is generally too well understood to require explanation. Let it be said that it refers to that motion of a vehicle when the center of gravity of the latter ceases to follow the direction imposed by the steering apparatus.

The skidding can take place at all wheels at once, or separately at the front or the rear wheels or one of either. The driving force exerted upon the vehicle and the application of brakes influence the rate of skidding at the front and at the rear end, therefore, the most favorable weight distribution in that connection. Supposing a driving wheel, Fig. 3, is exerting a pressure upon the ground. With a co-efficient of friction f between the wheel and the ground, the maximum tractive effort to be transmitted by this wheel is $F = p \times f$. Also if there is a force present, which acts sidewise upon this wheel, the latter will retain its adhesion to the ground as long as the supplied tractive effort in connection with the sidewise force result in a combination effort which is not more than $F = p \times f$. When the latter is reached, the wheel slips against the ground, in other words, it loses its grip upon the latter, and has a tendency to move sidewise under the influence of these acting forces.

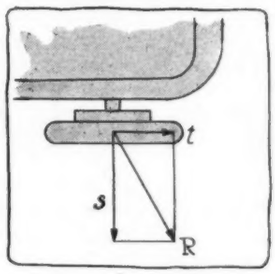

Fig. 4—Plan of the rear wheel in Fig. 3, showing the resultant, R, of the tractive force and a side force, s. It is this force, R, which causes skidding as soon as the wheel loses its hold on the ground

Fig. 4 represents the plan view upon the wheel of Fig. 3. With any given tractive effort t there will be found existing such a sidewise effort s which will combine with the former into a resultant force r equal to $F = p \times f$, consequently forcing the wheel to skid. From Fig. 4 it is seen that with increasing tractive force t less sidewise strain is necessary to bring the wheel into skidding. No doubt readers will have noticed this occurrence in practice, for instance, when leaving a level road for a hill. Although more weight is thrown upon the rear axle, in going up grade, this increase of load carried is not in proportion to the increased traction effort, whereas if the car is going as directed on the level it starts to skid on the up grade if conditions favor the origin of side efforts upon the rear wheels.

Applying Brakes Hard Is Dangerous

Acceleration of the motor also tends to throw an added weight upon the rear axle which increases the tractive effort practically in proportion to the weight carried. In this instance, the skidding is not made easier because the sidewise strain s which could cause it, must increase in the same proportion as the weight and tractive effort forces. On the contrary, the application of the brakes will have the opposite result, favoring the easier skidding under certain given side strains.

The truth of the above is retained only as long as the wheels have full adhesion to the ground until the skidding starts under the influence of acceleration or braking. The conditions are somewhat different when one accelerates or applies the brakes after the skidding has already taken place.

Heavy Rear Resists Skidding

The foregoing, which refers to the origination of skidding at the driving wheels indicates that there is less chance of such skidding with a greater load near the driving axle, the rear axle. This is easily confirmed by practical experience when driving a light car. One will have noticed that such a car without passengers in the rear easily develops the tendency to jump and slide at the rear end upon a more or less uneven road, when going at a high rate of speed. At the same time the well loaded front, namely, the steering wheels, permit controlling the direction of the car without difficulty, even with the sliding rear end.

On the other hand, the same car with passengers on the rear keeps to the road much better and steadier but in event of its going off from the desired direction the righting of it is much more difficult.

Weight at Rear Has Many Disadvantages

The concentration of the load at the rear end has also other disadvantages connected with it besides the steering. Its greatest disadvantage lies in the behavior of the car once it started to skid because the heavy rear end has a greater tendency to continue in its skidding motion overpowering the influence of the front end steering. During a skid one must consider that the skidding wheels have practically no adhesion to the ground, therefore, as will be seen from Fig. 6, during a skid, the car, with its weight concentrated at the rear end on the point R tends to turn round its front axle with an effort equal to the inertia of its mass acting upon a lever of the length a. Another car with its weight concentrated nearer to its middle generally will have a smaller acting effort of the inertia of its mass because its skidding motion at this new center of gravity M is less rapid than at the point R. Besides this smaller effort acts upon a shorter leverage b, which connected with better traction at the front wheels permits straightening of the car from the skid much easier than in the first case—with a heavy rear end. Notice the difference in efforts required, when skidding on a wet asphalt pavement with or without passengers and with smooth tire equipment.

Heavy Front Awkward But Less Dangerous

The concentration of the weight very near to the front end of the car is undesirable, also when considered in connection with a front skid with the natures of the rear and the front skidding being mostly different, there is less danger with a heavy front than with a heavy rear end, whereas the rear skid forces the car from its assumed direction, the front skid generally covers that case when the car continues to travel in a previously acquired direction even when the steering wheels are turned to the other end. Here the steering effort of the wheels, which is not the same as their traction, multiplied by their distance from the rear axle, forms a steering moment acting upon the car which is not sufficient to direct the motion of the latter mass from its assured way. The concentration of the mass further forward increases the

leverage upon which it tends to concentrate the steering movement.

On the other hand, the forward location of the center of gravity giving greater weight upon the front wheels also increases their tendency of adhesion to the ground, namely, their steering movement, and it generally reduces the chances for a dangerous front skid.

Inertia in Skidding

Acceleration or the application of brakes during a front skid are more or less inert in their efforts and are not influenced by the concentration of the vehicle weight in any point in the middle plane of the automobile. Their action produces inertia forces acting in the direction of the maintained vehicle motion. The increasing tendency of the vehicle to adhere to this wrong direction during the braking could be offset by the simultaneously increasing load upon the front axle, and naturally on the front wheels. *In some cases this braking can even stop the skid by increasing the load upon the steering wheels to an extent when they will regain their grip on the ground.* During acceleration the inertia of the mass gives a more undesirable effect by reducing the load carried by the steering wheels. In fact, one can start a front skid by acceleration on unfavorable conditions when the wheels otherwise still retain their adhesion to the ground.

In the event of a complete rear skid both the acceleration and braking produce markedly bad effects which at the same time are further impaired by the weight near the rear end. When both rear wheels lose traction this is a complete rear skid. Then, as a matter of fact, no acceleration can be produced in the full sense of the word. But the swifter rotation of these wheels, or their faster skidding relatively to the ground, reduces the already small co-efficient of friction between the two. *Thus chances are reduced to stop the slipping.* When the rear skid is caused by one of the rear wheels starting to slip, the car assumes a direction of motion at its rear end, such that the slipping wheel travels inwards following the motion of the other wheel, which moves outward. If in Fig. 5 the slipping wheel is A and the driving wheel is B, the accelerated motion on the latter increases the skid for obvious reasons, the skid being originated through the difference in the traction of the two wheels B and A. The concentration of weight near the rear axle in this case is of some slight advantage, because it takes a greater amount of work to pivot the car round the front axle on any given angle O, the displacement of the concentrated weight being greater with the increase of its distance from that latter axle. *A slight application of the rear brakes might help to righten the car, as long as the brakes do not lock. But the application of brakes as soon as one wheel begins to slip is apt to cause a worse skid than when the car is left entirely free with motor out as well.*

THE APPLICATION OF BRAKES DURING A COMPLETE REAR SKID IS VERY DANGEROUS. It cannot produce any great effort at the rear wheels, because the latter have very little adhesion then, but whatever effort is produced by the remaining slight friction adds to the force of inertia created by the skid for no advantage to the car. It tends to throw the weight of the car forward opposite to the direction as the braking acts upon the rear wheels. *Thus the rear end is materially lightened, its traction decreased and it is left more freely to skid in the started direction.* The concentration of weight at the rear is less desirable here because it retains the greater tendency to continue a skid with brakes applied, over that shown by cars with the center of gravity further ahead. Every day's practice confirms the above as well as the other cited examples.

The rather harmful influence of braking with both wheels slipping is easily experienced, also the resulting greater skid with a heavier load at the rear end. These items are particularly noticeable when the road conditions are more or less favorable for causing the skidding, for instance, when the car is on a sidewise incline like the street surface dropping towards the curb.

Rear Skids More Easily Than Front on Curves

The passing of a car on a curve gives another instance when the question of weight concentration could offer much material for discussion. With reference to Fig. 6 the load when concentrated at the rear exerts a centrifugal force acting sidewise upon the car and applied on a greater leverage to the pivoting point at the front axle than would be the case were the load placed nearer to the front. The rear end generally shows a greater tendency to skid on a curve than the front. That is explained by the discussion referring to Fig. 4, when it was shown that a smaller sidewise effort will cause a skid when the traction effort of the wheel is increased. The front wheels, having no tractive effort, can withstand a greater sidewise strain of the centrifugal force on curves than the driving wheels stand. *That is why it would make a more stable car for passing on curves to have the load concentrated amidship or slightly ahead of it.* Other things being equal, the practice when the load is decreased on the rear axle, the actual limit of the latter tractive effort will be reduced

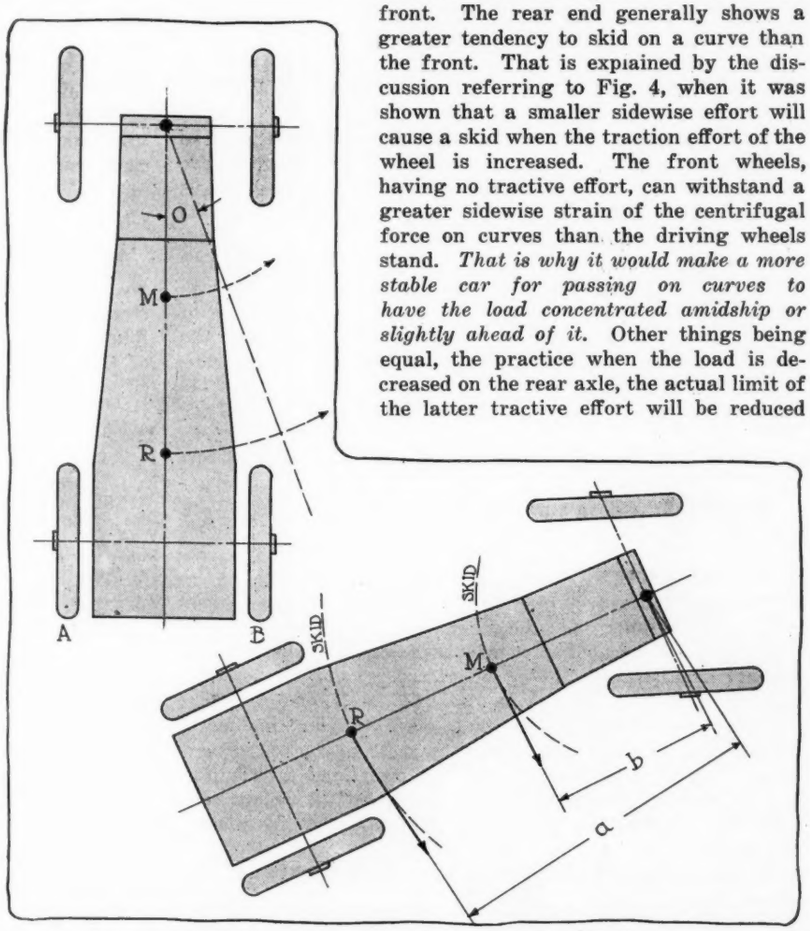

Fig. 5—Above—Diagram showing how a skid started through a slipping wheel, A, is increased through the accelerated motion of the other wheel, B. The rapidity of the skid depends largely on the position of the center of gravity, R or M

Fig. 6—Below—During a skid, when the wheels can be considered to have no adhesion to the ground, the car, with its weight concentrated at R, tends to turn around the front axle with an effort equal to the inertia of its mass acting on a lever of the length, a. With a more forward position of the center of gravity, M, the skidding action is correspondingly less rapid through the lessened leverage, b

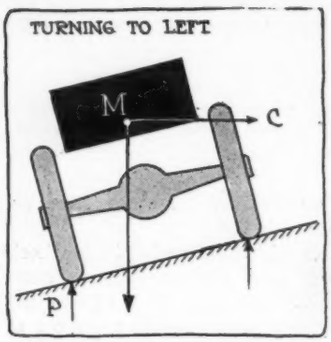

Fig. 7—Showing how the loss of traction on the raised outer wheel in turning and the consequent tendency to skid is counteracted by the centrifugal action of the mass M acting in an outward direction

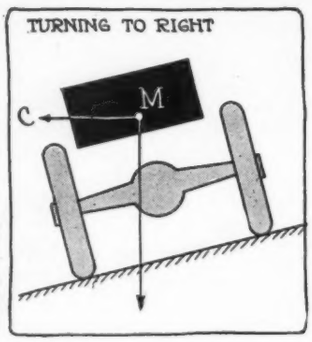

Fig. 8—In turning to the right, however, on the same slope, the tendency to skid is much increased since the centrifugal force, C, is assisting gravity to reduce the adhesion of the inner raised wheel

also, making a proportionally easy skidding car on account of the reduced grip of the wheels to the ground. The weight distribution apparently would become noticeable in its bad effects only when the wheels lose their adhesion to the ground at the time of passing curves.

THE CONCENTRATION OF WEIGHT IN FRONT WOULD BE MORE DANGEROUS FOR A FRONT SKID AND THE CONCENTRATION AT THE REAR END WOULD BE MORE LIKELY TO CAUSE A REAR SKID, WHICH OCCURS MORE OFTEN.

When passing a curve with a simultaneously sidewise road inclination the driver is required to act differently to preserve the stability of the car, whether the inner or outer wheels are on the up grade. *With the outer wheels higher than the inner ones, acceleration just before striking the incline increases the stability and braking tends to pull the car inward.* It is clear from Fig. 7 that on this incline the left wheel receives a greater part P of the load M, hence the addition of a greater centrifugal force C to equalize the loads upon the wheels. *The greater traction on the inner wheel when accelerating cannot cause a skid because its action is directed against that of the centrifugal force, but the skid would have to be expected when the car is traveling in a straight line. Here the inner rear wheels would slide down when accelerating.*

When braking on a curve or on a straight stretch in both cases a front skid can occur.

Centrifugal Force a Factor on Curves

The situation represented in Fig. 8 when the outer wheel on a curve is lower than the inner is extremely unstable, the centrifugal force of the vehicle assisting its skidding outwardly together with the action of the gravity force. *It is best to avoid that situation or apply the brakes before reaching it.* In any event, the braking, even when on this curve, is advantageous, the action being opposite to the centrifugal force. In all cases, a more or less even load distribution would be best because once a skid is started the weight concentration in the rear offers greater difficulties to the steadying of the vehicle.

Further illustration of the two actions referred to above is given in Figs. 1 and 2.

Center of Gravity Ahead of Rear Axle

When concentrating much load at the rear end one has to be very careful to retain the center of gravity more or less ahead of the rear axle, which is absolutely essential for proper stability. The limit which the center of gravity may occupy will be largely determined considering the vehicle upon a grade: Referring to Fig. 9, where C represents the location of the center of gravity, there will exist an angle A with the horizontal when practically no load will be carried on the front end of the car, or steering wheels. A steeper grade with an angle B will, in fact, cause the lifting of the front end of the car from the ground *because the line of gravity action intersects the ground behind the rear wheels at a point* M.

The danger of such conditions is obvious. To prevent them one can build a car of longer wheelbase and with a lower center of gravity the latter has to be close to the rear end. However, it would be preferable at the same time to concentrate the weight more amidship. One must keep in mind that even if the static treatment of the problem shows the line of gravity action intersecting the ground well ahead of the rear axle under assumed extremes upon a grade there remain the forces of inertia when accelerating and the force of wind resistance, which form another component adding weight to the rear and tending to lift the front end.

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Goodrich Pay Car Has Safety Bulletin

AKRON, O., July 27—A new device in the field of big manufacturing has been brought out by the B. F. Goodrich Co., Akron, O. It consists of a safety bulletin attached to each pay record card. The pay record card is designed to help the employee keep track of the number of hours he has worked each day, the amount of piece work he has finished and the daily earnings that result.

In addition, however, the card carries a safety talk, touching on a different topic each issue and a new card is published every half month. One safety bulletin tells how to care for a certain ailment, the next what to do to prevent infection of wounds and a third will give advice on the efficiency and possibility of increasing production on piece work.

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Electric Vehicle Show October 7-17

NEW YORK CITY, July 27—The Electric Vehicle Show will he held in Grand Central Palace, this city October 7 to 17, starting on a Wednesday evening and closing on the second following Saturday night. The show is under the direction of Charles Parker, care of the New York Edison Co., this city.

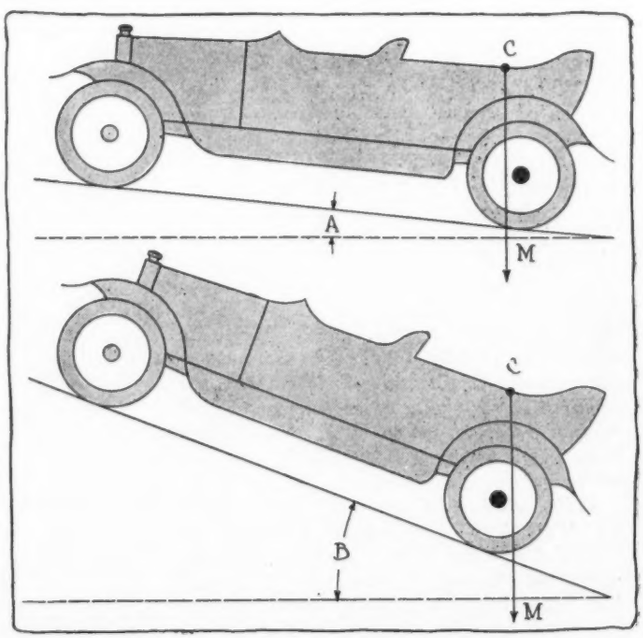


Fig. 9—Diagrams bringing out the necessity of keeping the center of gravity in front of the rear axle. On an incline the effect is equivalent to bringing this point further back

N. A. C. of C. in Summer Session

NEW YORK CITY, July 24—At the business meeting of the directors held at Christmas Cove, Me., on July 21, Dodge Bros., manufacturers of automobiles, in Detroit, were admitted to membership in the National Automobile Chamber of Commerce.

A Truck Convention

The directors endorsed the plan of the Commercial Vehicle Committee for a convention of commercial vehicle interests to be held some time in the fall, the date and place to be selected at the September meeting of the Chamber.

Besides routine matters there were interesting reports from committees on patents, traffic, good roads, legislation and shows. The members were the guests of Samuel A. Miles.

President Charles Clifton presided, while the others in attendance included: S. D. Waldon (Packard); Wm. E. Metzger (Argo); Albert L. Pope (Pope); H. H. Rice (Waverley); Wilfred C. Leland (Cadillac); Roy D. Chapin (Hudson); L. H. Kittredge (Peerless); C. C. Hanch (Marmon); Col. George Pope, Treasurer; S. A. Miles; Alfred Reeves, General Manager; Charles Thaddeus Terry, Counsel; and by invitation, Thomas Henderson (Winton).

Sports a Feature

Keen competition in outdoor sports by leading automobile manufacturers who combined business and pleasure, was a feature of the meeting.

There were three days of the house party, with the directors' meeting held on Tuesday, July 21.

Everyone participated in the sports, there being a tie between the Blues and the Grays, with 20 points each, necessitating a run off at the meeting next summer.

By a score of 6 to 2 the Blues captured the baseball games, being credited with 5 points; the pool and billiard contest, by 150 to 143, taking 10 points and a victory in the water sports netting 5 points.

Clam Bake Great Success

The Grays scored first in the clay pigeon shoot by 27 to 26, receiving 10 points; their team caught the greatest number of fish—104 to 67, for 5 points, while they were credited 3 points for second place in the water sports and 2 points for jumping the bar. The clam bake was held on Sunday and fishing contest and fish fry on Monday.

The manufacturers assembled at Portland last Saturday, going to Bath in motor cars and from there to Christmas Cove by boat.

The clam bake in full swing at Christmas Cove

Col. Pope demolishing clams at the clam bake on S. A. Miles' estate

Chas. Thaddeus Terry, counsel, at ease on the rocks of Christmas Cove, Me.

Left—The party of the National Automobile Chamber of Commerce at S. A. Miles' estate. Top row—Nickerson, Sweet, Garden, Thompson, Post, Reeves, Kittredge and Rice. Middle—Hanch, Wetzel, Budlong, Col. Clifton, Swetland, Edwards, A. L. Pope, Billings and Metzger. Lower—Mrs. Margaret Pratt, S. A. Miles, Henderson, Leland, Col. Pope and Mrs. S. A. Miles. Right—Miles and Waldon consuming lobster, etc.

Springless Valves Are Latest Racing Development

Positively Operated Types Will Probably Not Be Confined to Racing Cars—Were a Success in French Grand Prix for 1914

PARIS, July 17—Multiple overhead valves, front wheel brakes and positive operation of valves on both opening and closing movements constituted the mechanical novelties of the cars taking part in this year's French Grand Prix and intended for the other European road races of the season.

Valves Success in Race

Although positively-operated valves were not found on the winning machine, they, nevertheless, constituted the greatest technical development in connection with the race, and gave promise of an extended application in the near future. Two makes of car used this type of valve arrangement: Delage and Th. Schneider. The valve system was not at fault in the failure of these two makers to win the race.

The Th. Schneider motors were designed and built by G. Michaux, an independent automobile engineer, who was responsible for the rise and success of Peugeot in the racing field. Peugeot first entered racing with single-cylinder, long-stroke motors, developing to twins, and then to fours. It was with these machines produced by Michaux that Boillot and Goux gained the experience which enabled the former to win the Grand Prix 2 years in succession.

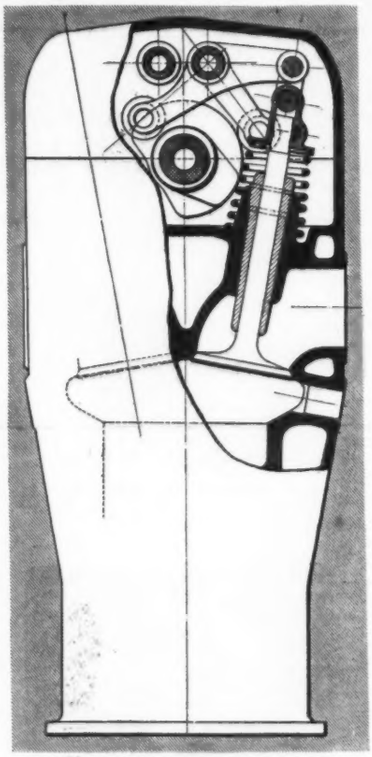


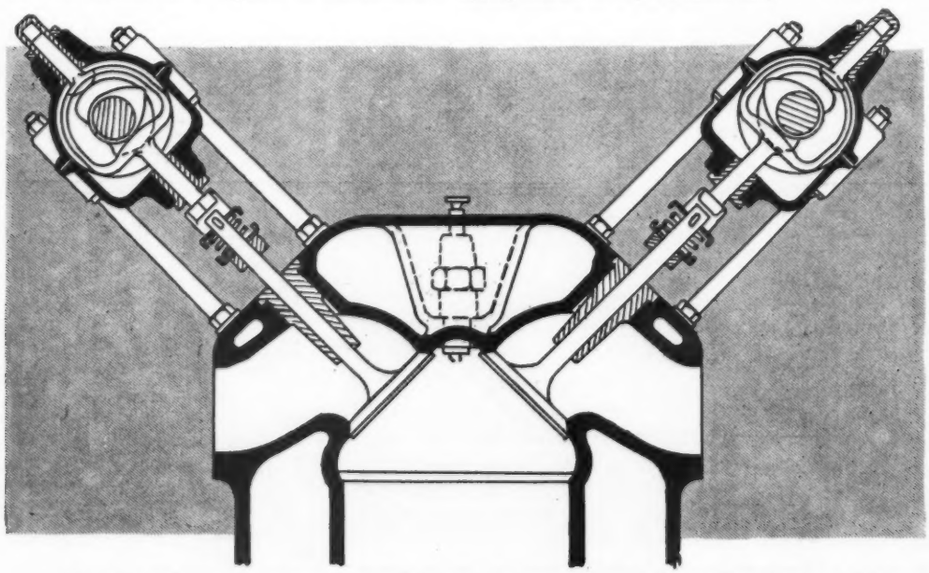
Fig. 1—Section through cylinder head of Schneider motor, showing overhead cam and positive operation of valves. Spring shown is a precaution only

Since severing his connection with Peugeot, Michaux has devoted considerable time to the development of the high-speed motor with positively-operated valves. He has secured patents on the detail construction of this valve gear, and evidence that the device is not likely to be confined to racing cars is to be found in the fact that a leading French firm never having taken part in a road race has secured an option on the purchase of this patent.

Cam Opens and Closes

The positive-valve motor differs from the others by having no necessity for valve springs, a cam not only assuring the opening of the valve but causing its return to the valve seat. In this respect it is similar to the sleeve-valve motor, where the uncovering of the ports is positively assured.

Claims made for this type of valve mechanism are a higher number of revolutions, a greatly increased factor of safety and higher power. With the spring-controlled, single-cam valve, a point is reached when the spring is incapable of seating the valve before the cam has again begun its opening movement. Light valves and strong springs have made it possible to extend the limits considerably, but the valve still remains the limiting factor in



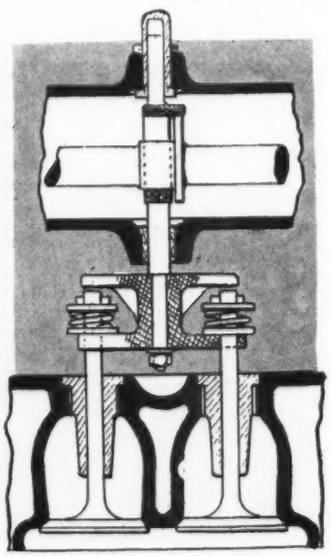
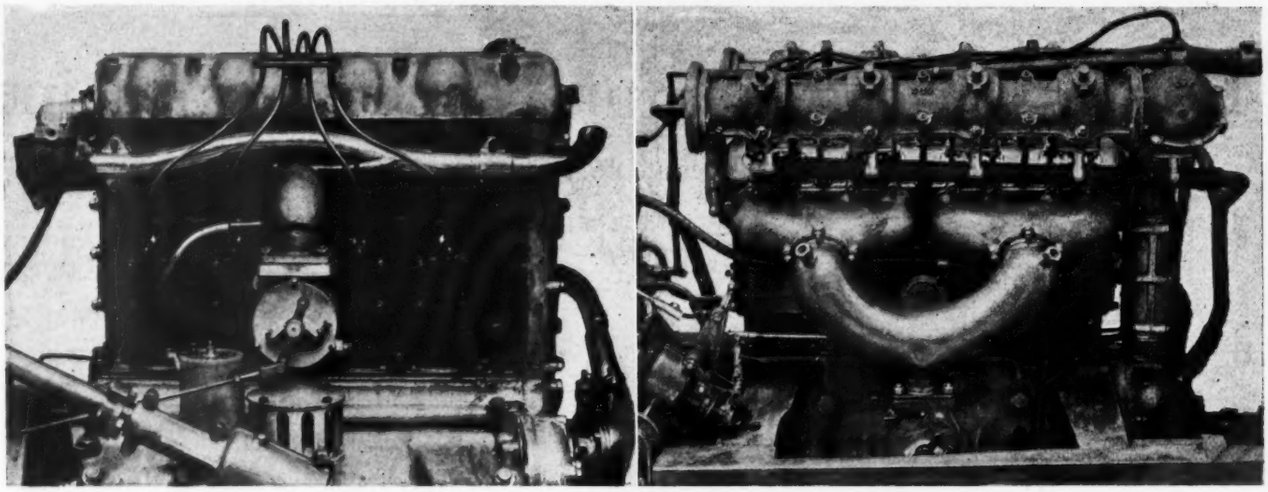


Fig. 2—Arrangement of the springless inclined valves in the Delage, which has two overhead camshafts and sixteen valves.
Fig. 3—Showing how each cam operates a pair of valves on the Delage



Figs. 4 and 5—Left, intake side of Schneider racing motor used in the Grand Prix, showing arrangement of overhead camshaft. Right, intake side of Delage motor, showing the two overhead inclosed camshafts

the speed of the motor. With the positively-operated valve it is no longer the valve which limits the speed of the motor.

The No-Spring Scheme

The Michaux arrangement is shown in Fig. 1. There are two valves per cylinder inclined at 10 degrees from the vertical. With a cylinder diameter of 94 millimeters, the valve diameter is 60 millimeters. The valve stems are of big diameter. Owing to positive control there is no necessity to lighten this part in an unusual degree. With such a diameter valve stem breakage is not to be feared.

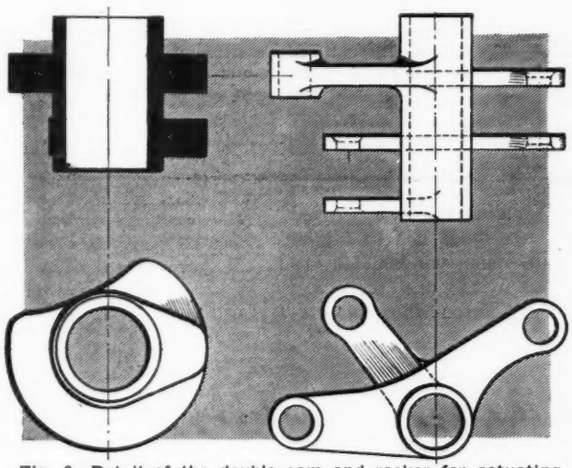


Fig. 6—Detail of the double cam and rocker for actuating the Schneider valves

A single overhead camshaft has eight pairs of cams; these are shown in detail. Also for each valve there is a three-arm rocker, one arm of which is positively connected to the stem of the valve, and the two others are in contact respectively with the opening and the closing cams. A short connecting link is screwed on the end of the valve stem and locked in position, the other end being attached to the rocker arm. This allows adjustment to be made between the valve and the rocker.

Rocker Follows Cam Profiles

One cam and one rocker arm assure the opening of the valve and the corresponding rocker and cam assure its closing. The closing cam has exactly the opposite profile to that of the opening cam. Thus, considering the opening cam as having a convex profile, the closing cam has the corresponding concave profile. Thus the rocker constantly follows the profiles of the cams; there is no moment when it is left free to be operated on by a valve spring.

It will be noticed, however, that a light valve spring is shown in the drawing. This is provided to give a final seating to the valve after it has been closed by the cam. As proof that it is not necessary for valve closing, it may be mentioned that on Champoiseau's car, which finished ninth, one of these springs broke and worked up around the connecting link, where it was entirely inoperative. The breakage was not discovered until 3 days after the race, when the motor was entirely dismounted for a detail examination.

The whole of the valve mechanism is contained within an overhead aluminum cover, and every part is lubricated, the return of the oil being by way of the timing gears at the front to the basechamber.

The camshaft is hollow and is carried in four ball bearings—one at the rear, one in the center and one on each side of the camshaft pinion. The two shafts carrying the two sets of rocker arms are also hollow, and oil grooves are bored in the rockers themselves, so that lubricant is delivered direct to the rollers. There is no valve cage, and the bronze guide for the valve stem is of slightly taper section and is screwed in position.

Owing to the absence of suitable appliance for making brake tests at 3,000 r.p.m. and more, it has not been possible to get comparative data on the power developed from the motors run in the Grand Prix and those of equal dimensions with spring-controlled valves. It is claimed, however, that the power curve will show a much more steady rise than that of a spring-valve motor and will continue rising where the latter begins to fall off.

Apart from the valve arrangement, this motor is interesting by reason of the use of roller bearings for the crankshaft. These bearings are of the R. B. F. make and have been used for crankshafts the first time this year. By reason of their use it has been possible to get the shortest crankshaft of any motor in the Grand Prix, and also to employ a single-piece crankshaft. With ball bearings the shafts were all of the built-up type. The only difficulty in connection with this bearing was the placing of the central one.

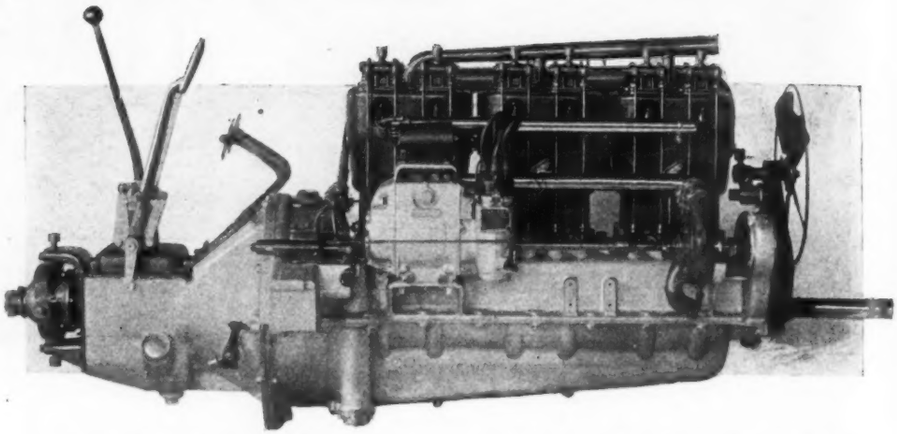
Camshaft Drive by Gears

A train of spur pinions communicates the movement from the crankshaft to the overhead camshaft. These intermediates have a ball bearing each side of them, one bearing being received in the cylinder casting and the other in the aluminum cover. The same applies to the camshaft pinion.

On the right side the water pump is driven off the train of pinions and on the opposite side the high-tension magneto is driven in a similar way. The revolution counter is driven directly off the end of the camshaft.

Lower Prices Feature New Buick Line

Tungsten Steel Replaces Nickel Steel in Valves—Multiple Piston Rings—Pistons 1 Inch Longer—New Upholstery and Equipment



Right side of Buick six-cylinder unit power plant. The camshaft operating the overhead valves through rods is situated on this side as well as the Delco electrical system. Note mounting of gearshift and emergency brake levers and gearbox. Also specially designed universal joint at rear of gearbox for relieving the driveshaft of torsional strain

BUICK has reduced the prices on all of its models for 1915 and in addition has added many improvements. Tungsten steel valves replace the nickel steel ones; multiple piston rings succeed the individual types; improved piston lubrication is added; pistons are made nearly 1 inch longer; new upholstery is added; rain-vision windshields are fitted; inside top curtains have been fitted; and there are other minor improvements local to the different four and six-cylinder models.

Non-Skid Tires on Rear Wheels

The 1914 line of models is continued with the same trade nomenclature and the same general design. Motor sizes are the same, tire sizes have not been altered except that non-skids are now used regularly on the rears and plain treads in front; in a word, the 1915 models are refined continuations of the 1914 line.

The prices of the models have now been cut as follows:

Model	Body	1914	1915	Reduction
C-55 (six)	Touring	$1,985	$1,650	$335
C-36 (four)	Roadster	1,235	1,185	50
C-37 (four)	Touring	1,335	1,235	100
C-25 (four)	Touring	1,050	950	100
C 24 (four)	Roadster	950	900	50

The greatest price reduction has been made in the six, $335. Touring car prices are cut $100 and roadster prices, $50.

Cowl board and control features in the new Buicks as found on the large four and six. Note mounting of speedometer in cowl board face

Bodies Are All New Designs

The bodies are all newly designed. Radiators have been rounded fully at the top; their edges have been coped over; hoods have been given more of a slope, and nowhere are there any protruding points to disturb the general impression of smoothness.

The upholstery on the larger cars is of modified European form. The formerly used leather padding extending over the edges of the body has been cut out and the upholstery is kept within the body lines of the car. Leather beading on the body edges without padding replaces the formerly used trim stick, and gives a distinctive touch.

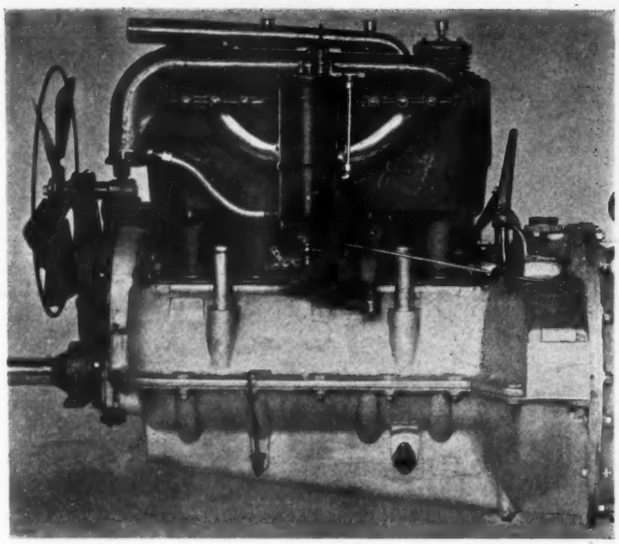
Cowl Board Added to Four

Concealed hinges are on doors of the fours, the six having them this season. Another four improvement is the addition of the cowl board which was used only on the six this year. This cowl board is very well arranged. One feature of equipment is the new type of sight feed used for determining if the oil is circulating. This little instrument has vanes rotated by the flowing oil. These also rotate a pivoted flat piece of metal rubbing on the inside of the glass face. Thus the glass is kept clean and the oil flow can always be seen.

New Ventilating Windshield

A rain-vision, ventilating windshield is new to all models, and adds to the appearance. Inside-operating curtains are another feature of the equipment, which is really complete in every detail. Special rigid tire carriers are fitted to the rear of the cars.

Although somewhat altered in body design, the changes in the mechanical features of the Buicks are very slight. Motors have come in for practically no alterations except minor



Manifold side of Buick four-cylinder unit power plant as used on models C-36 and C-37, showing vacuum gasoline feeder mounted above carbureter. This is a part of the Stewart gravity fuel feed system used on these cars

ones. The distinctive type of overhead-valve engine with gearset in unit is still rigidly adhered to, there being no differences in the cylinder dimensions. The type of drive inclosing the propeller shaft in a torsion tube also remains.

Pistons Lengthened 1 Inch

But what changes there are in the engine are well worth mentioning. In order to give a greater bearing surface to the pistons of the large four- and six-cylinder motors, and to eliminate any possibility of piston slap, the pistons have been lengthened 1 inch to 5 inches, and a new oiling feature has been incorporated in these pistons. On either side and directly above the piston pin bearing a gash has been made with a No. 3 B & S cutter. Drilled diagonally in the center of this gash a hole runs through the boss and opens into the bearing. Further, a relief groove is cut one-quarter around the circumference of the piston below the lowest ring slot. This scoops the oil on the cylinder wall and sends it to the gash where it passes through the drilled hole to the piston-pin bearing. Thus, little or no oil is wasted and smoking is nearly impossible, for any excess oil is trapped and must go within the piston.

New Type of Piston Ring

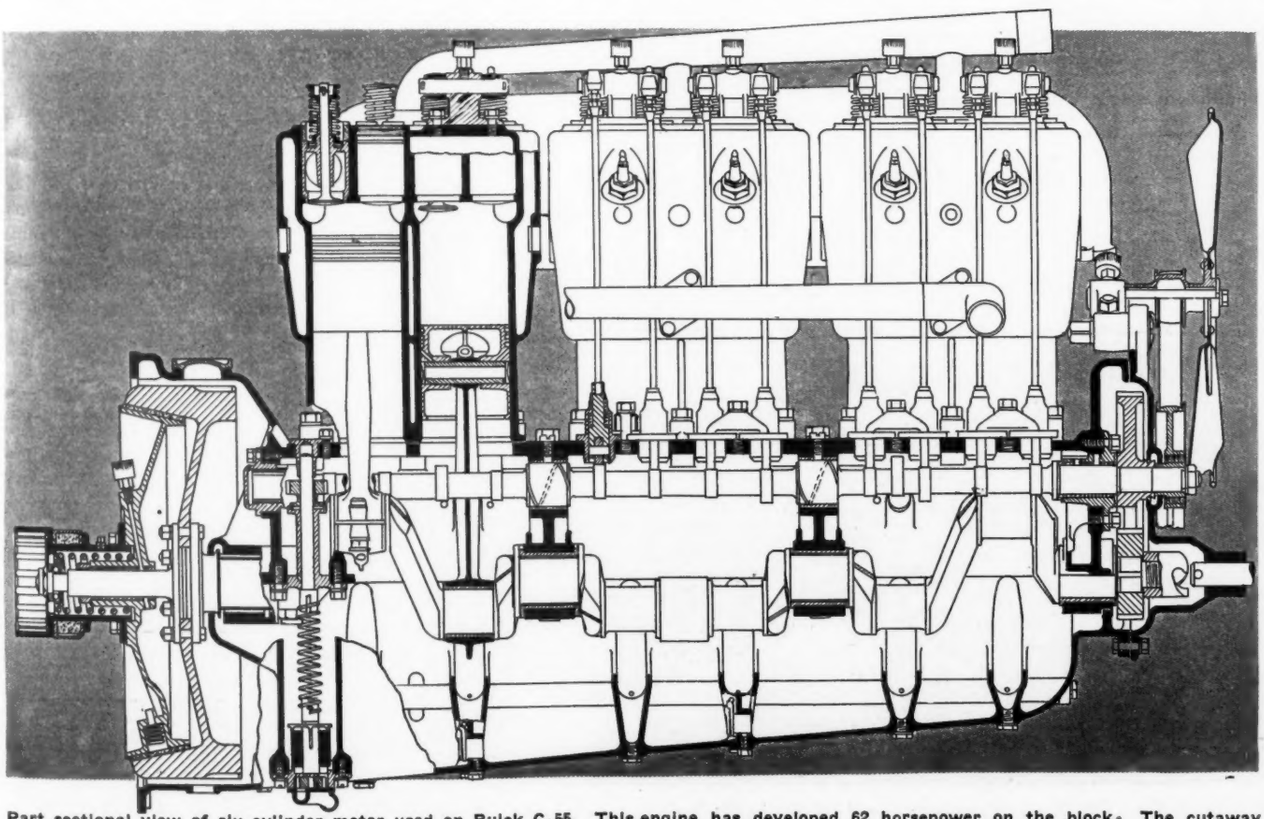
A new type of piston ring which is being adopted by many of the best known car manufacturers is used. Three thin steel rings are placed in each of the three ring slots per piston. These are a cold-rolled steel stock which is first coiled and then sawed, giving the separate rings. These are said to run in quicker, to hold the compression much better and they also take any wear.

Cylinders Cast in Pairs

Reviewing the mechanical features of the two larger models, the six and the big four, there is really no difference except in the number of cylinders and the size of some of the parts, and in the rear springing which has already been commented upon.

Cylinders of these motors are cast in pairs, their size being 3.75 inches bore and 5 inches stroke, giving the six a displacement of 331.35 cubic inches and the four, 220.9 cubic inches. Block tests have developed 42.5 horsepower for the four and 62-horsepower for the six, despite the fact that the formula ratings are 22.5 and 33.75, respectively. The stroke-bore ratio of 1.33 has much to do with this.

There has been no alteration of the valve mechanism. Ball-and-socket joints on the rods and rockers are used, which



Part sectional view of six-cylinder motor used on Buick C-55. This engine has developed 62 horsepower on the block. The cutaway section through the two end cylinders gives an excellent idea of the typical overhead valve construction used in Buick motors

Left—Side view of 1915 six-cylinder Buick model C-55, selling at $1,650. Right—Front view of Buick six for 1915. Note stream lines and attractive head-on appearance

make the working parts noiseless. The rockers are pivoted at their center to an arm common to each set of valves, which arm bolts to the top of the cylinder.

Exhaust Discharges Formed from Cylinders

The manifolding is peculiar in that the exhaust, with a separate opening into the header from each cylinder is carried above the intake which has a common opening for each cylinder block. The exhaust manifold also departs from the conventional in that the connection to the exhaust pipe is at the front end instead of the rear, that is, the gases pass forward to their outlet instead of back.

The combination Delco cranking, lighting and ignition system is with the Buick again, though much simplified over a year ago. It is of the 6-volt, single-wire type with grounded return circuits. The ignition part on the large fours and the six is now fitted with an automatic spark advance in addition to the regular hand advance on the steering wheel. Naturally this tends to more efficient motor performance, the automatic advance feature giving the needed spark variation above or below the set point as determined by the hand spark lever and within certain limits of this set point.

Simplified Delco Electrical System

The Delco apparatus has been greatly simplified by the elimination of the ignition relay and the cut-out relay, the operation now being through the switch on the dash which closes the ignition and generating circuits.

The unit incorporates a new system of current regulation which has for its main advantage the fact that battery charging is made easier, causing greater output at lower speeds than heretofore. To do this, the automatic spark advance and the ignition control are operated in combination by a centrifugal governor. This regulation shows a current output curve with a peak at speeds of from 1,000 to 1,200 revolutions a minute. This is at car speeds of about 10 to 12 miles an hour.

The model C-24 and C-25 Delco unit has its current controlled by a bucking coil, and the automatic spark advance feature is not used.

The cranking is done by connecting the electrical unit, which is temporarily operating as a motor, to the flywheel face gear by means of a pedal. Preliminary downward pushing sends a small current to turn the electric motor slowly and thus to readily mesh the gears, while complete downward pressure sends the full current for cranking.

Generator Runs at Engine Speed on Fours

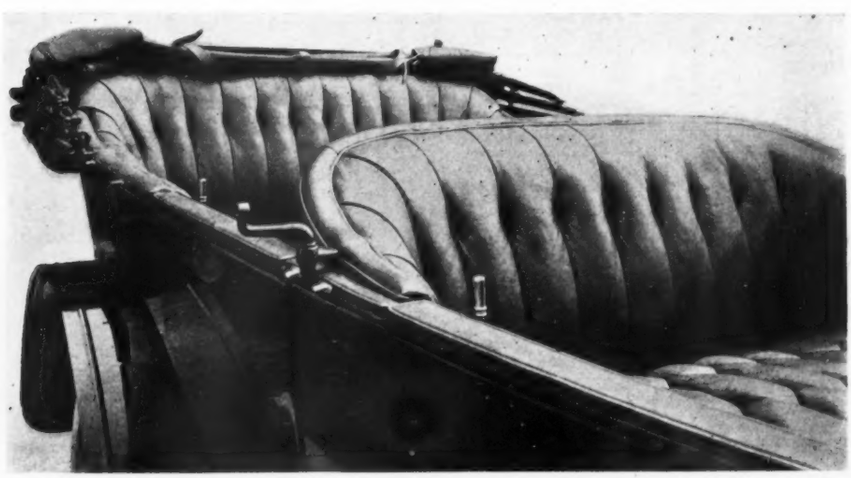
The generator speed is the same as that of the engine with the four-cylinder types, while that of the six is run at one and one-half times engine speed. The gearing ratio for cranking, however, is the same for both the big four and the six, namely, 21 to 1. Eighteen to 1 is the reduction with the small four.

The storage battery used is an Exide located under the front floor boards. It is rated at 80 ampere-hours and is of the three-cell type. This unit is the same for all cars.

One special feature of note in connection with 1915 Buick wiring is that all wires are inclosed within conduits, even the connections between any two wires being within small T or L connectors. This should make the system proof against all conditions. Headlights are provided with dimmers, there being no side lights fitted.

On the larger four-cylinder models and the six a new method of delivering the gasoline to the carbureter is employed. While the gasoline tanks are still carried at the rear and hung below the frame level, the force feed has been replaced by a modification of the Webb Jay, or Stewart, method of vacuum feed. The vacuum apparatus is mounted on bosses cast on the intake manifold, and is high enough so that the fuel can flow from it to the carbureter by gravity. The device is really a method of automatically creating a vacuum within it, thus utilizing atmospheric pressure to send the fuel to it. This gets away from all the troubles experienced with pressure feed due to leaks, pressure pump failure and the like.

As to the oiling system: A constant-level splash system with the lubricant



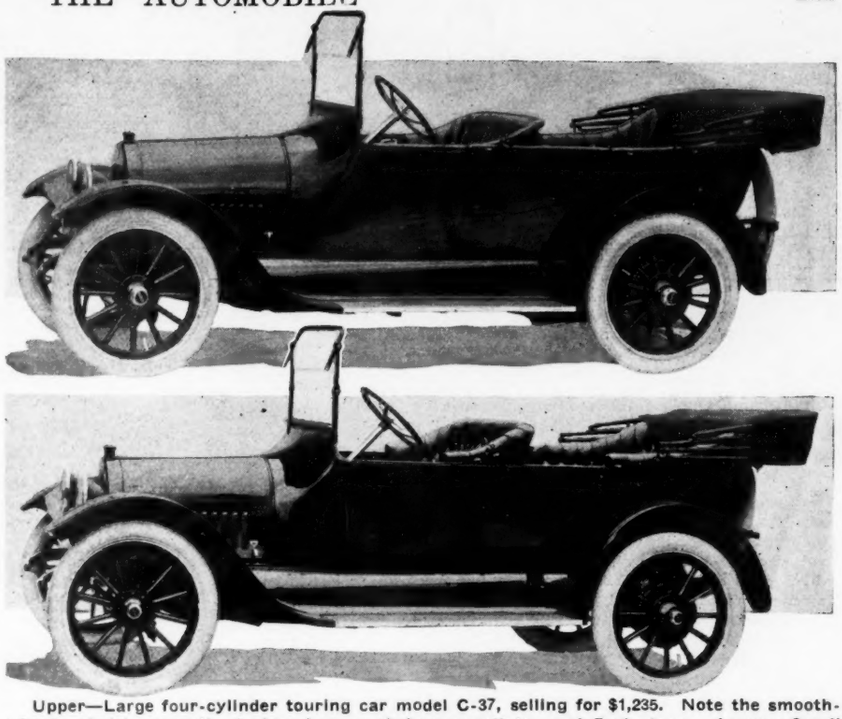
Showing the new type of upholstery used on the larger Buicks. The leather cushions do not extend over the edges of the bodies and the leather trim of the edges replaces the trim stick

circulated by a gear-driven pump operated by bevel gearing from the rear end of the camshaft is used. A distributing pipe located along the inside of the crankcase supplies oil to the several splash troughs under the connecting rods. The oil, which is splashed up into the cylinders and which finds its way through the gashed pockets in the sides of the pistons, flows down the inside of the crankcase where it is caught in ducts which convey it to all of the motor bearings.

Three-Point Suspended Power Plant

The motor, gearset and clutch unit is three-point suspended conventionally from the main frame. The intake and exhaust manifolds are located on the left of the motor. The right is given over to the long push rods extending up from the camshaft to the rocker arms operating the valves and to the Delco electrical unit and water pump.

There is a change in the rear spring construction on the six-cylinder model only. Cantilever springs replace the three-quarter elliptics used this year. These are pivoted at both ends and have a length of 50 inches with a width of 3 inches. They have eight leaves with the shortest on top in the usual way. The lower leaf is rolled up at its ends to form a bearing for the spring bolts attaching it to axle and frame.



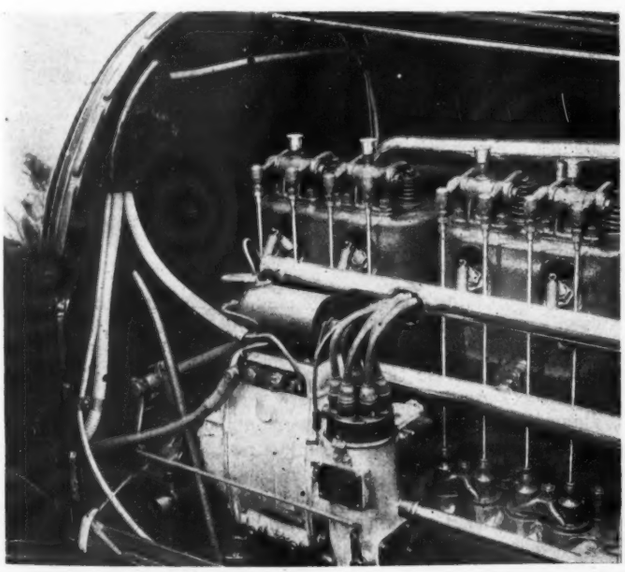
Upper—Large four-cylinder touring car model C-37, selling for $1,235. Note the smooth-edged upholstery on the body; also rounded-over radiator and flush doors. Lower—Small four-cylinder touring car model C-25, selling for $950

Little Four Has Separate Gearset

It should be mentioned here that the smaller four-cylinder chassis has a motor of the same overhead-valve type but its gearset is not in unit, nor is the piston stroke as long, although the bore is the same as the others. The stroke is 3.75 inches, giving a piston displacement of 165.6 cubic inches, and according the engine a horsepower of 30 on the block. While the motor has the new style of steel piston rings, its pistons are not gashed as are the others, nor is the vacuum system of fuel feed incorporated. The carbureter gets its gasoline by gravity from the tank under the seat on the touring car and back of the seat on the roadster. Pistons have come in for 1-2 inch of lengthening for the same reasons as set forth for the increased length on the larger motors.

There is no difference in the drive or frame members of the chassis of any of the models over this year. The gearset is substantially the same for all with the exceptions of necessary size increases with the bigger cars. Center control is used, and with 7-8-inch face gears, shifting to one or the other of the three speeds is very efficient. Transmission gear ratios are 3.36 to 1 on first, 2.23 to 1 on second, and 4.32 to 1 on reverse. The clutch cone is of pressed steel instead of cast aluminum.

Instead of the regular strap fuses heretofore used, the switch on the cowl board is provided with a circuit breaker. This protects all the circuits except the generator circuit, in which the current flows both ways.



Delco electrical unit as mounted on the larger Buicks for 1915, showing the inclosure of all wires in conduits. The unit is driven by a shaft from the timing gears and is mounted at the right rear of the motor, the starting motor operating on the flywheel

Special Universal Relieves Driveshaft Strain

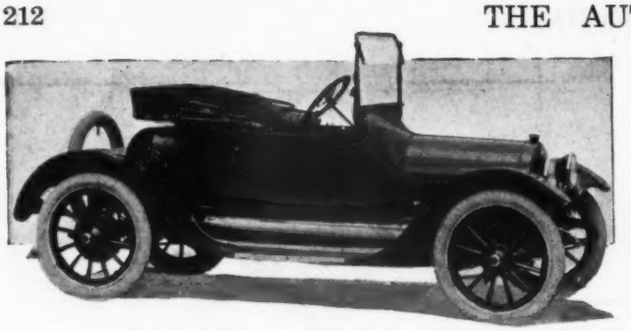
Drive is direct to the bevel gears in the rear axle, the usual construction of having a universal joint at the front end when the shaft is inclosed being used. The specially-designed Buick universal bearing on the front end of the third member relieves the universal joint of the driveshaft of any strain.

The fours have three-quarter floating axles with heat-treated nickel steel axle shafts carried on roller bearings. The six is fitted with a floating axle, its shafts being of nickel steel carried on annular ball bearings.

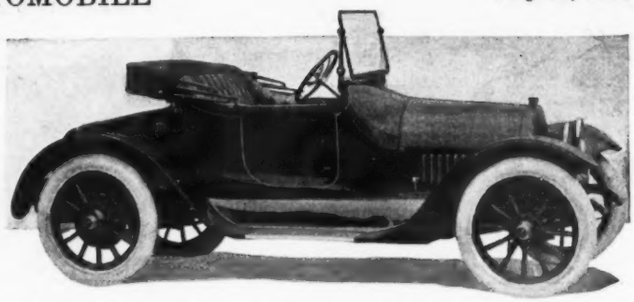
There is no change in wheelbase of any models with the exception of that of the small fours. The dimension has been made 106 inches instead of 105 inches. The other fours have 112 inches between wheel centers, and the six is still 130 inches.

Demountable Rims Are Standard

Tires have been retained at 32 by 3 1-2 for the small fours, 34 by 4 for models C-36 and C-37 and 36 by 4 1-2 for the six. Non-skids are fitted to the rear of all cars, the fronts being plain treads. Demountable rims are standard as formerly.



Small four-cylinder roadster Buick model C-24, selling at $900. Note the new rain-vision ventilating windshield



Larger four-cylinder roadster model C-36, selling at $1,185. Note the streamline body with rear deck

The Buick crankshaft for either four or six is a three-bearing one, the supports being of ample size. The camshaft has an equal number of bearings. Some motor dimensions follow:

	Six	Large Four	Small Four
Front crankshaft bearing	1 7-8 x 2 7-16	1 7-8 x 2 7-16	1 5-16 x 3 5-16
Center crankshaft bearing	1 7-8 x 2 1-2	1 7-8 x 2 1-2	1 5-16 x 2 3-8
Rear crankshaft bearing	2 x 3 21-32	2 x 3 21-32	1 5-16 x 3 1-4
Front camshaft bearing	1 3-16 x 29-64	1 3-16 x 2 29-64	1 x 2 11-16
Center camshaft bearing	1 27-32 x 1 5-8	1 27-32 x 1 5-8	1 11-16 x 1 1-2
Rear camshaft bearing	1 5-16 x 1 7-8	1 5-16 x 1 7-8	1 1-8 x 1 7-16
Crank pin bearings	1 7-8 x 2 1-4	1 7-8 x 2 1-4	1 3-8 x 2
Wrist pin bearings	15-16 x 2 3-8	15-16 x 2 3-8	3-4 x 1 3-4
Valve diameter	1 1-2	1 1-2	1 1-4
Valve lift	9-32	9-32	1-4
Flywheel diameter	16.44	16.44	13.7
Flywheel weight	81 pounds	81 pounds	58 pounds

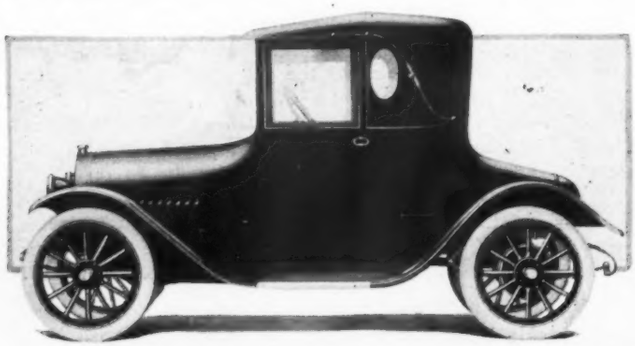
Bearing diameter is first dimension given.

Krit Company Adds a Cabriolet Body to Its Line

DETROIT, MICH., July 27—A three-passenger cabriolet body has been added to the Krit line and will be ready for delivery shortly after September 1. This body has been designed to meet the needs of physicians and others desiring a low-priced closed design. It will sell for $1,350 equipped with Disco starter and generator.

Streamline Type of Body

The radiator, hood and front end of the body are the same as those on the front of the roadster and touring designs which now make up the line. The entire exterior of the car is of curved design, giving a streamline form from the radiator to the end of the tapered rear deck. The driver's cushion is 16 inches wide and is placed slightly forward of the cushion for the other passengers. The larger seat for the two passengers is 32 inches in width. All the passengers face forward.



New cabriolet body seating three passengers, which has been added to the Krit line. This body is especially designed to meet the needs of physicians and others desiring a low-priced closed car. The price is $1,350 with Disco electric system. Deliveries will begin September 1

The upholstery used in the car is optional and may be of hand-buffed leather or cloth. The car is finished in blue with black running gear and gray wheels.

The Krit chassis which was described in THE AUTOMOBILE for November 13, 1913, has a four-cylinder L-head block, 3 11-16 by 4-inch motor. The motor, clutch and gearbox are a unit and are suspended from the chassis at three points. A notable feature of the motor is that the crankshaft is carried on two ball bearings. It is capable of 3,100 revolutions per minute. The rear axle is semi-floating. The car is driven from the left side and also has left control.

The Krit Co. state that although they got a late start for the 1914 season, only being able to supply a few demonstrators last November, business has been very good, foreign business having gone beyond the company's expectations while the domestic business is on the increase.

30 per Cent. Ahead of Last Year

The actual increase in volume for the past seven months is very close to 30 per cent. over that of the same period during the 1913 season. It is true that there has been, during the past few weeks, a slight falling off in some sections of the country but this does not seem to be universal, in fact business in some sections of the country with us is much better now than at any previous time during the season.

Aluminum Continued for Castings

Although many manufacturers of moderate-priced cars have discarded the use of aluminum for their crank and gearcases for some reason or other, the Krit company is still using this metal throughout the entire power plant wherever practical so that the power plant complete, including transmission, carbureter, magneto and fan, weighs but 368 pounds. The five-passenger touring car weighs less than 2,100 pounds, with standard equipment and only about 70 pounds, more when equipped with electric self-starter and generator.

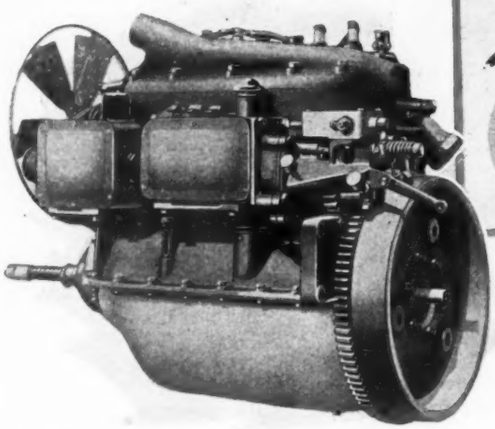
Bodies are exceptionally roomy and of the genuine streamline type, which lines have been fully completed by carrying them out into the rounded, tapering bonnet and rounded, tapering radiator.

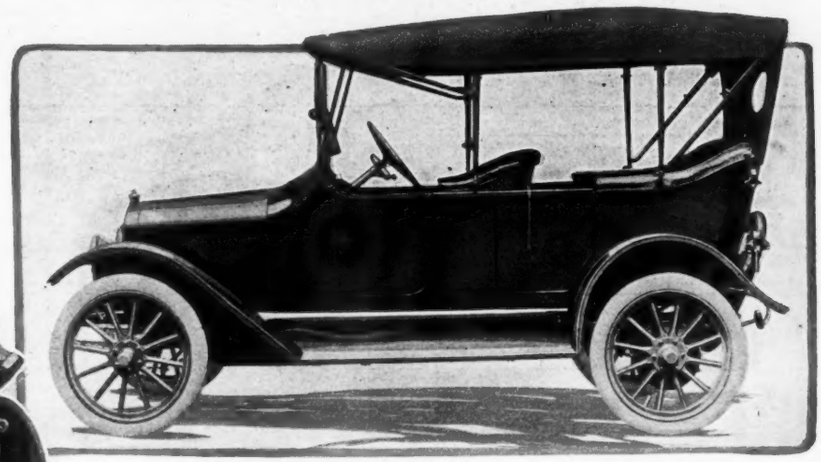
Many Minor Refinements

The gasoline tank is placed under the shroud, making for convenience, a more positive feed to the carbureter, and also has allowed for a reserve supply. The upholstering is deep and the seats low so that the occupants sit in the body and not on top. An instrument board, leather covered, conceals the gasoline tank. On this instrument board is mounted the electric light switches, the steering post bracket, flush type speedometer, flush type ignition switch and the gasoline tank filler. The steering wheel is large, having nickel plated spider and nickel plated spark and throttle levers on top. The floorboards and running boards are covered with cork linoleum with aluminum binding. The top is of mohair, equipped with Jiffy curtains and mohair top cover. The windshield is built into the body without the use of stay rods and is of the clear vision, double ventilating type.

1915 Maxwell 25 Price Cut $55

Complete Gray & Davis Electric System $55 Extra





Left—Left side of four-cylinder block motor used in Maxwell 25 for 1915. Note mounting of Gray & Davis cranking motor and generator on brackets on the upper half of the crankcase

Above—Side view of Maxwell 25 five-passenger touring car for 1915 with top up, showing new sloping hood rounding into the cowl in which the gasoline tank is located. The front edge of the radiator is rounded over. The fenders are crowned. This car sells for $695 as compared with $750 for the 1915 model

THE price of the Maxwell 25 for 1915 has been reduced $55 on all models, this reduction notwithstanding the fact that many body improvements have been made and several chassis alterations effected. It includes gas headlights and oil side lamps. If you want the complete Gray & Davis electric cranking and lighting equipment you pay $55 more, or in other words, you get the complete electrical equipment for the same price that the car sold for this year.

The touring car lists at $695. The roadster lists at $670, the town car at $920, and the cabriolet, which is a new body type, at $840. These figures include gas and oil lighting. Add $55 to each for the electrical equipment.

Maxwell Features

—

Streamline Cowl and Hood
Fuel Tank on the Dash
Two-Piece Windshield
Dash Instrument Board
Crowned Type of Fenders

The Maxwell 25-body style is new in many respects. There is now a sloping hood which rounds into the cowl where the gasoline tank is carried instead of under the front seat as formerly. The front edge of the radiator is rounded over. There is a new two-piece windshield. Crowned fenders are used, and the space between these fenders and the body in front and rear completely inclosed. An instrument board is added, and back of it is located the gasoline tank with filler pipe at the right of the board. The wheelbase remains at 103 inches on all models.

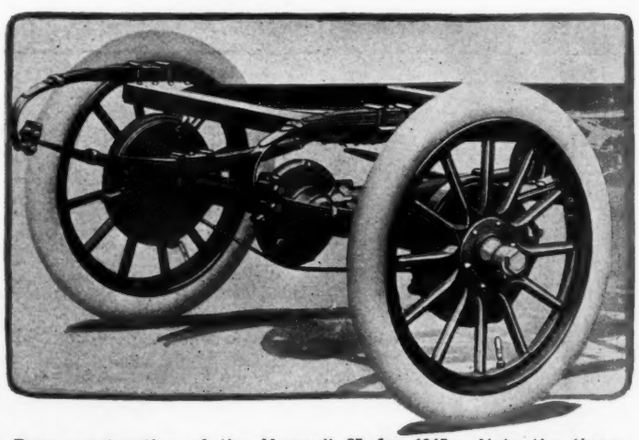
The Starting Equipment

When the Gray and Davis cranking motor and generator are supplied they are carried on brackets on the left side of the upper half of the crankcase. The brackets are cast integrally with the case. The generator is placed ahead of the motor, to be in line with the fan pulley, from which it is driven by belt. Thus the same belt drives the fan and the generator in triangular fashion. The pulley diameters give the generator a speed of 2¼ times that of the crankshaft, and it charges the battery at the full rate when the car is running from 12 to 15 miles an hour.

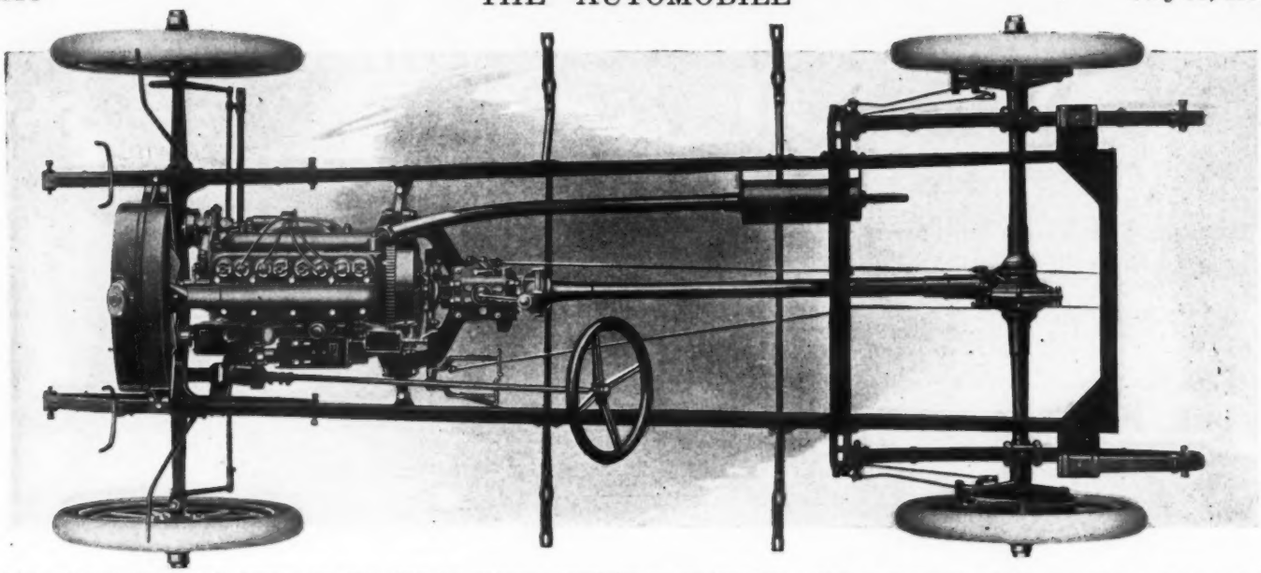
The cranking motor, which has the ability to spin the engine at the rate of 130 r.p.m., is fitted to gear to the teeth of a ring gear fixed to the outer rim of the flywheel. The gear train between the electric motor and the flywheel gives a relative electric motor to engine speed of 30 to 1. The shifting for cranking is of the usual form. Pressure by foot on the plunger pedal starts the electric motor and engages the starter pinion with the flywheel.

In connection with the electric system a Pumpelly storage battery of 80-ampere hours capacity is used. In accordance with general practice these days, there are no side lights with the electrically equipped Maxwell. The 9-inch headlamps are fitted with a dimming coil in the switch which serves to reduce the light for city driving.

Mechanically, the chassis is practically as in 1914, although

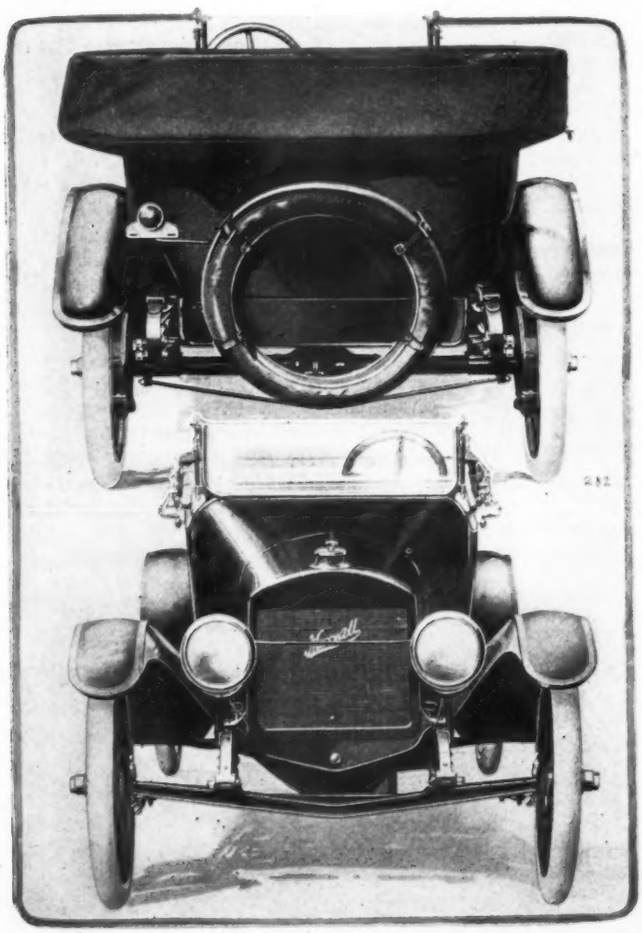


Rear construction of the Maxwell 25 for 1915. Note the three-quarter elliptic rear springs



Plan view of Maxwell 25 chassis for 1915, showing extreme simplicity of construction. Note unit power plant suspended at three points and mounting of compact gearbox for center control

several refinements are included. First is the replacing of the semi-elliptic rear springs which connected to spring horns at their rear ends with three-quarter elliptic rear springs with scroll ends.



Above—Rear view of Maxwell 25, showing tail light and license bracket combination, new crowned fenders and mounting of extra tire

Lower—Front view of Maxwell 25, giving an idea of the new streamline hood and cowl as well as of the rounded front on the radiator

A second change is the shifting of the carbureter from the left of the engine to the right. In the older motor, although the valves were on the right, the fuel went through a passage cored in the cylinder casting. This change was made to make room on the left for the cranking and lighting units, when they are specified, but it has the advantage of making a shorter passage for the gases. In its new location the Kingston atomizer type carbureter is in rear of the magneto and very accessible, being higher up than formerly on account of the higher position of the fuel tank in the cowl as compared with its former position under the seat.

A third new feature is the radiator construction. The radiator shell which is rigidly fastened to the frame is entirely independent of the core which carries the cooling water tubes. Thus the delicate part though securely held in place does not receive all the frame weaving strains which the shell does and the possibilities of springing leaks and damaging the tubes are reduced to the minimum. Replacement of the core is also made cheaper and easier by this construction.

New Control Features

Although drive is still on the left and the control in the center, a new type of steering post which fastens by a bracket to the cowl board for rigidity is used. Instead of the former spark and throttle lever arrangement wherein the two levers were on opposite sides of the steering column, they are both now mounted on a quadrant. It is below the wheel. An added refinement is the placing of the horn button on one end of the quadrant and convenient to the driver's hand.

Motor Is Little Altered

Reviewing the Maxwell chassis constructional features, the motor first commands attention. It is practically as it was in design except for the carbureter shifting and the provision for the mounting of the electrical units. The cylinders are cast in a block with the cylinder head detachable and suspension at three points in unit power plant form. Although the flywheel is unenclosed, the gearbox is made a part of the unit by a yoke circling the flywheel and bolting at either side to the integral crankcase supporting arms.

The cylinders 3 5-8 by 4 1-2 have a piston displacement of 185.8 cubic inches, a stroke-bore ratio of 1.24 and a S. A. E. horsepower rating of 21.1. The maker rates it at 25 horsepower under normal conditions, and it is probable with its long stroke that it will turn up an excess of this amount on the block.

The crankshaft has two main bearings, and it as well as

the camshaft and connecting-rods are constructed of manganese steel which is very rigid. Timing gears, housed at the front, are made of nickel steel and all working parts are well designed to be as light as possible and consistent with the work they have to do. Their dimensions should make for efficient operation.

Several motor dimensions follow:

Crankshaft bearing diameter—1⅞ inch.
Front main crankshaft bearing length—2½ inches.
Rear main crankshaft bearing length—3 inches.
Connecting-rod lower bearing length—1½ inch.
Valve diameter—1 9/16 inch.
Camshaft bearing diameter—1 inch.
Front camshaft bearing length—2 inches.
Rear camshaft bearing length—1¾ inch.
Wrist pin bearing—¾ inch diameter; 2¾ inches length.

Troughs for Connecting-Rods

The lower half of the crankcase carries the oil reservoir used for splash lubrication. A plunger pump located in the timing gear case, and operated by an eccentric on the camshaft, lifts the oil from the reservoir to the four splash troughs under the connecting-rods. After the oil has been splashed onto the various bearing surfaces by the rod ends, it finally finds its way back to the reservoir through a drain at the rear of the case and after being filtered is recirculated.

Thermo syphon cooling is used. A Simms dual type high-tension magneto driven by shaft on the right gives the ignition current. It may be locked from the dash.

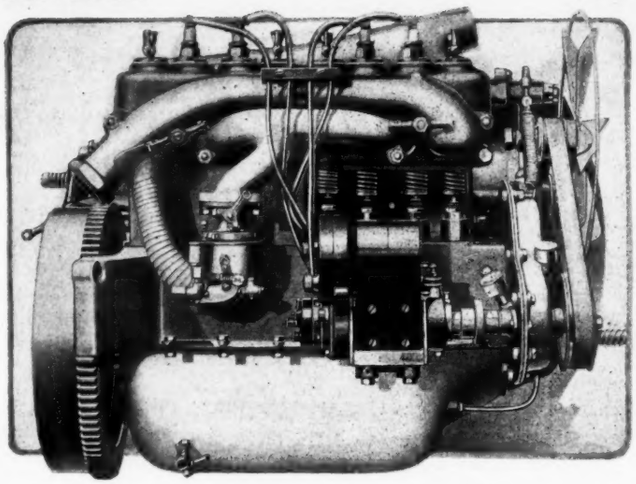
The clutch is a cone type with asbestos lining, the cone being a steel stamping.

The gearset is unaltered and affords the usual three forward speeds. Gears are nickel steel, and Hyatt bearing in connection with a bronze bushing is used at the front end o the main shaft. The rear end is carried on a babbitt-line bearing. Phosphor bronze bushings are used on the jackshaft.

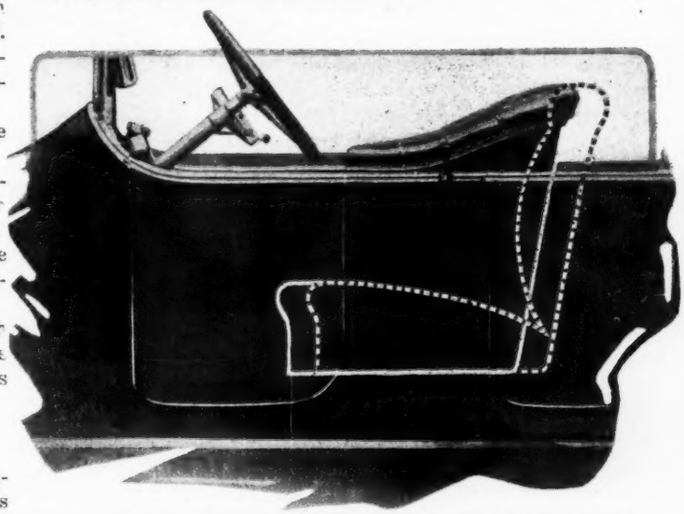
The propeller shaft is inclosed within a torsion tube with one universal joint at the front end. There are no radius rods, the tube taking the drive and torque. Other members are unnecessary with a chassis of this weight.

Three-Quarter Floating Axle

The rear axle is a three-quarter floating type with conventionally constructed bevel gearing and with the springs mounted above it. Brakes are of the usual contracting and expanding type acting on rear wheel drums. The standard wheel equipment calls for wood wheels with 12 spokes front and rear, on which clincher rims are fitted. These carry 30 by 3 1-2-inch tires all around.



Right side of Maxwell 25 motor, showing mounting of magneto and carbureter together with flexible hot air intake for carbureter. Note drain cock at bottom of crankcase



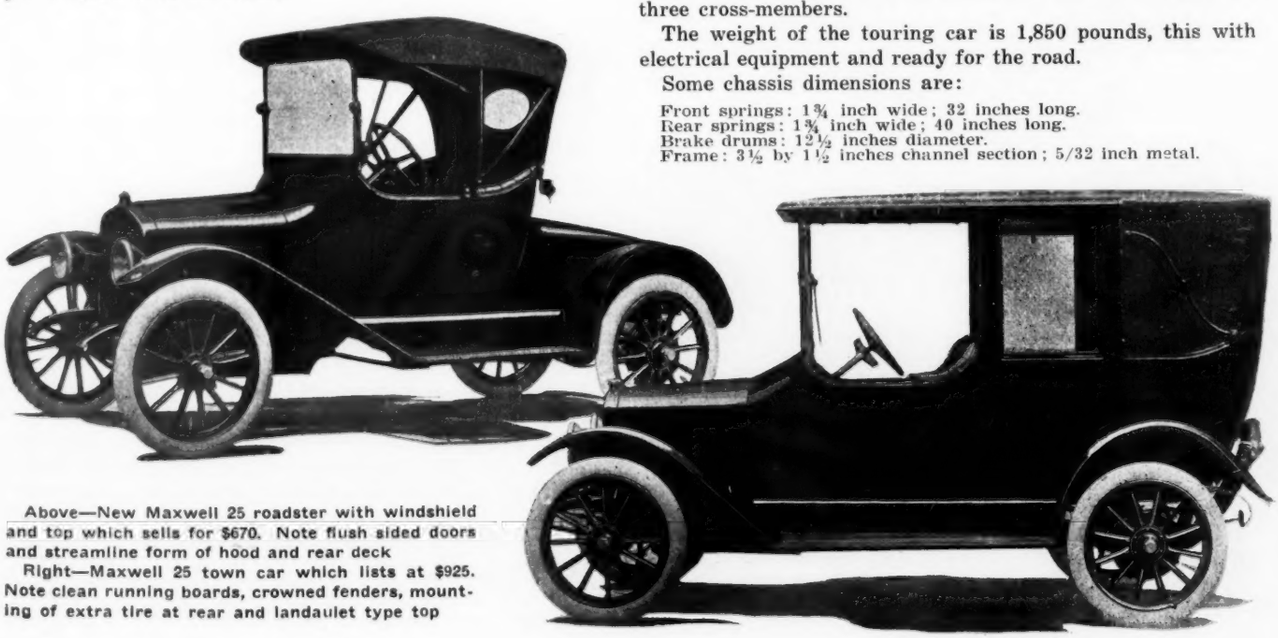
Adjustable front seat on new Maxwell 25. The dotted lines show the two positions which may be obtained by shifting the seats

To insure good body support, the frame is tapered from 33 7-16 inches at the rear to 28 inches at the front. There are three cross-members.

The weight of the touring car is 1,850 pounds, this with electrical equipment and ready for the road.

Some chassis dimensions are:

Front springs: 1¾ inch wide; 32 inches long.
Rear springs: 1¾ inch wide; 40 inches long.
Brake drums: 12½ inches diameter.
Frame: 3½ by 1½ inches channel section; 5/32 inch metal.

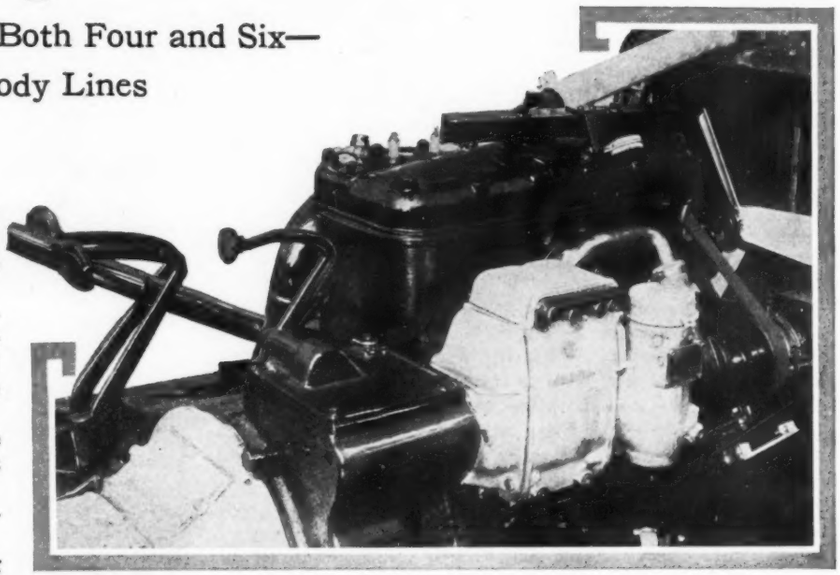


Above—New Maxwell 25 roadster with windshield and top which sells for $670. Note flush sided doors and streamline form of hood and rear deck

Right—Maxwell 25 town car which lists at $925. Note clean running boards, crowned fenders, mounting of extra tire at rear and landaulet type top

Two Oakland Chassis for 1915

Five Body Types Fitted to Both Four and Six— Improved Boat Body Lines



Right side of 1915 Oakland four-cylinder motor, showing mounting of the Delco electrical unit on the right

THE Oakland program for 1915 has been narrowed down to two chassis —a four and a six. On these, five types of bodies are fitted.

The four-cylinder model 37, is a much-altered continuation of model 35, the smaller four of 1914. Its price is still $1,200 and it is difficult to imagine a more refined and attractive light car.

The six-cylinder model, Six-49, is the new edition of this season's model 48. It is reduced in price $100 to $1,685.

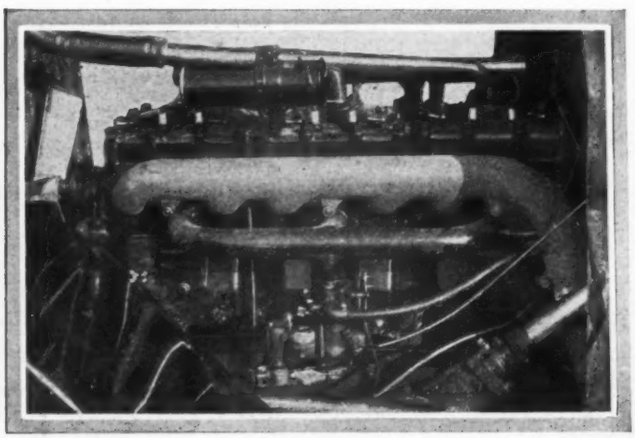
The 1914 model 43, has been discontinued.

Both new models reflect the designing hand of the company's new engineer, Eric Wahlberg. The four is not only mechanically practically a new job throughout, but its body lines are truly European. The six has not come in for much mechanical change, but its body lines have been much modified and hold to practically the same design as the four, on a somewhat larger scale.

Boat Body Lines Improved

The body lines are a modification and improvement of the boat body lines which have appeared in Europe. Beginning at the cowl, the upper edge sweeps in a very flat curve to the rear, while the contour of the cowl itself is scarcely a break from the slope of the hood. The latter is full rounded at the top, and the radiators have been shaped to preserve the general line. They are V-shaped in still better design than heretofore.

Though very similar in outward appearance, the two models are widely different in mechanical construction, and because of this fact, they will be described separately. The four-cylinder model, with its many new features naturally comes first.



Valve side of compactly arranged six-cylinder motor used in model 6-49 Oakland

With its motor refined, and its maximum speed increased; with completely re-designed frame; with a new type of drive and with the elimination of a great many brake rod and lever bearings due to the use of special spring pivot mechanisms, the four-cylinder model 37 has little in common with its predecessor, and with even greater strength and stamina, is several hundred pounds lighter.

The motor comes nearest to corresponding with that of last season's car. It is still 3.5 by 5 inches. It is suspended, as have been all previous Oakland motors, at three points.

A High-Speed Type Motor

Engineer Wahlberg characterizes the motor in its new form as a high-speed type, it operating up to 2,500 or 2,600 revolutions per minute. This is brought about by decreasing the weight of the reciprocating parts; by increasing the valve diameter and lift; and by proper manifolding in which the gas passages are not restricted and the cylinders permitted to draw in a full charge when the throttle is open.

This latter is achieved by arranging the throttle axis parallel with the center line of the motor. It is pointed out that every throttle mounted in the regulation way at right angles to the motor center line acts as a deflector and the flow is not symmetrical with respect to this center line. The throttle arrangement as Oakland now uses it is said to distribute the gases equally either way.

Pistons Have Been Crowned

No alteration has been made in the three-bearing crankshaft, but the pistons have been crowned so as to make them as strong as possible with the lightest weight. In line with the growing tendency, they are fitted with nine thin carbon steel rings, three to each ring slot. These rings have square joints, and will very soon lap themselves into the cylinders due to the small wearing surface. Due to the multi-ring construction, the gas has to leak through nine places instead of three or four as is the case with the old type of rings before any compression is lost.

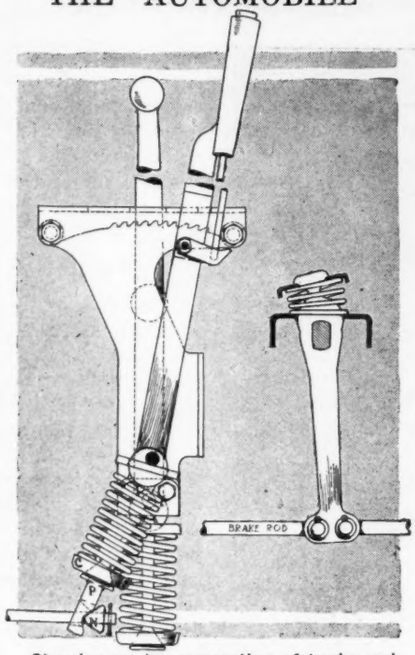
The L-head cylinders are cast in a block with the head detachable as this year. It is securely held in place by a

number of holding bolts arranged in bosses around the edge. This head when removed completely exposes the piston heads and the inside of the cylinders.

Intake and exhaust manifolds are on the left, the former above the latter allowing the carbureter to be conveniently located. Valve springs and stems are completely inclosed on this side, the covers having breather vents in them. The valves are of tungsten alloy steel and have been increased from 1 9-16 inch in the clear to 1 5-8 inch. Timing gears are spirally cut.

Radiator Capacity Increased 20%

The motor is positively cooled by a centrifugal pump located ahead of the Delco electric unit on the right side. It introduces the water into the center of the jacket on the right. The radiator has 20 per cent. larger capacity and is of the fin-and-tube type, made narrow in order to easier take the strains which are put on it when the frame twists on uneven roads. The large tank top has been continued, thus carrying considerably more water than can be contained by a flat type.



Showing wedge connection of brake rod end to lever, eliminating bearings, on model 37 Oakland

Stewart Vacuum Fuel Feed

Although the gasoline tank is still placed at the rear and below the frame level, it does not feed by pressure as formerly but, instead, the Webb Jay, or Stewart, vacuum-gravity system of introducing the fuel into the carbureter is employed. The vacuum tank is mounted on the front of the dash and it is connected to the intake manifold. This latter creates suction enough to draw the gasoline from the rear tank to the vacuum tank on the dash. This has upper and lower portions, the upper filling first, the float in it raising as the amount of gasoline increases. When the level has reached a certain height, this float trips a valve mechanism which shuts the vacuum line off and opens the upper portion to the atmosphere. This will send the gasoline into the lower part of the tank which part is open to the atmosphere always. It connects with the carbureter and in this way gravity feed is obtained with the tank in the rear.

The motor has the latest type of Delco combination electric unit, mounted on the right side and driven from the front gears when operating as a generator and gears to the flywheel through a gear train when performing the cranking function, and has the ignition distributer in unit with it.

Single-Wire Electrical System

The system is of the 6-volt, single-wire type with grounded return circuit, is simple and reduces the wiring to the minimum. The principal improvement in the Delco unit this year is the current control which is connected with the automatic spark advance, another new feature. The latter consists of a centrifugal governor which automatically advances the spark when the speed of the motor increases within a certain range of the position set by the hand spark advance lever on the steering wheel. The current controlling device is purely mechanical, and consists of an arm wiping a brush over a coil wound so as to cause maximum current output at low car speeds. Thus the main advantage is that when the car is being driven at ordinary low speeds of from 10 to 15 miles an hour the battery is being kept charged.

This will be appreciated by those who do much city driving, and whose lights burn considerably, while they also use the starter a great deal. Such drains would soon discharge the battery were it not being charged at nearly any driving speed.

The gear reduction between the Delco unit and the flywheel for starting is the same as this year, namely, about 25 to 1.

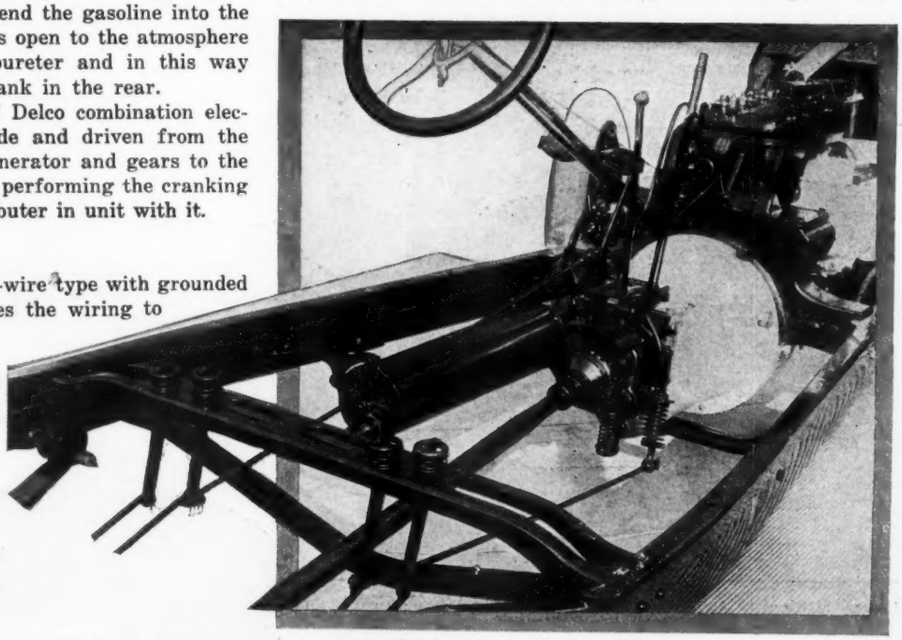
The gear train, which is shifted into mesh with the flywheel face gear by pushing a pedal, is completely housed within a case which is integral with the flywheel housing and the right rear supporting arm. As a generator, the unit is driven at engine speed.

An Exide battery of 80 ampere-hours capacity and carried under the front seat is a part of the electrical equipment.

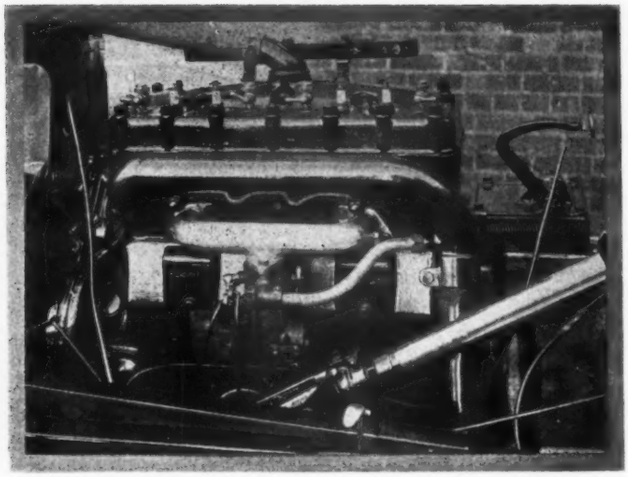
In connection with the lighting system, the headlights are provided with a dimming attachment, thus eliminating side lamps. The ignition distributer which was separate from the main electrical unit is again made integral with it. Another refinement is the locking of the electric horn button by the ignition switch, that is, when the ignition is off, the horn circuit is also disconnected.

The cone clutch has six spring inserts. An oiling device for the clutch shifting collar has been added. The grease cup mounted on the end of the clutch shifter shaft leads through a hole on the inside of this shaft, through the tube into the box on the clutch shoe, thus lubricating it.

Bolted to the flywheel housing is the three-speed gearbox, which is unchanged in design. The center control is principally the same as it was, although all bearings of both



Brake rod scheme on model 36 four-cylinder Oakland, which eliminates all bearings, springs on rocker shafts and wedges replacing them. These are noiseless and free from rattle due to the springs. They require no lubrication



Valve side of four-cylinder block motor used on model 37 Oakland

emergency brake lever and shifting lever have been eliminated. The sketch on page 217 shows the method of doing this. Springs on the bottoms of these levers hold their small trunnions down against fixed supports and thus allow them to oscillate or rock back and forth within the necessary limits. These springs take up all wear and the constructions eliminate any necessity of lubrication at these points.

Unnecessary Bearings Eliminated

By a similar use of springs and wedges, many bearings of like nature are eliminated, thus reducing the necessary care the owner has to give his car to the minimum. Throughout the brake operating system, there are no bearings to take care of, or places to oil. On the brake rods, on the clutch shifter, on the clutch link, on the emergency brake, on the control lever and on the brake rocker shafts which are under the center cross-member this is true. The brake rocker shaft levers get their oscillatory freedom through the compressibility of the springs which hold them in place by retaining cups. These cups may readily be removed by turning them at right angles to their fastening position so that their larger slots will clear the heads of the rocker levers. This same principle of removal applies to the other spring mountings referred to.

Special wedge connections of the brake rods to their lever ends are also original. These are shown in the sketch on page 217. The threaded end of the rod passes through the end of the lever which has its front side concaved to take the edge of a wedge which screws onto the threaded rod end. A cotter pin beyond it and through the rod prevents its coming off, while it is self-locking due to its fitting into the concaved lever end. Adjustment is therefore very easy. The great advantage of these connections is that they may be allowed to rust or get mud-and-water-soaked without interfering with their operation.

Lower Spring Leaves Take Drive

The drive to the rear axle is of the Hotchkiss type, replacing the formerly used design with inclosed propeller shaft. In the new construction, the lower leaves of the rear springs are so constructed as to take the drive and the torque, in that sudden shocks are not transmitted to the chassis mechanism, the springs giving a cushioning effect. This construction is also lighter.

Instead of the solid propeller shaft heretofore used, the model 37 is equipped with a tubular shaft of 1 1-2-inch outer diameter and 1-8-inch wall. It is of medium carbon, seamless tubing, the stub ends of the universal joints being electrically welded on either end. Though 50 per cent. lighter than a solid shaft, it is much stiffer. It will not whip as would a heavier shaft.

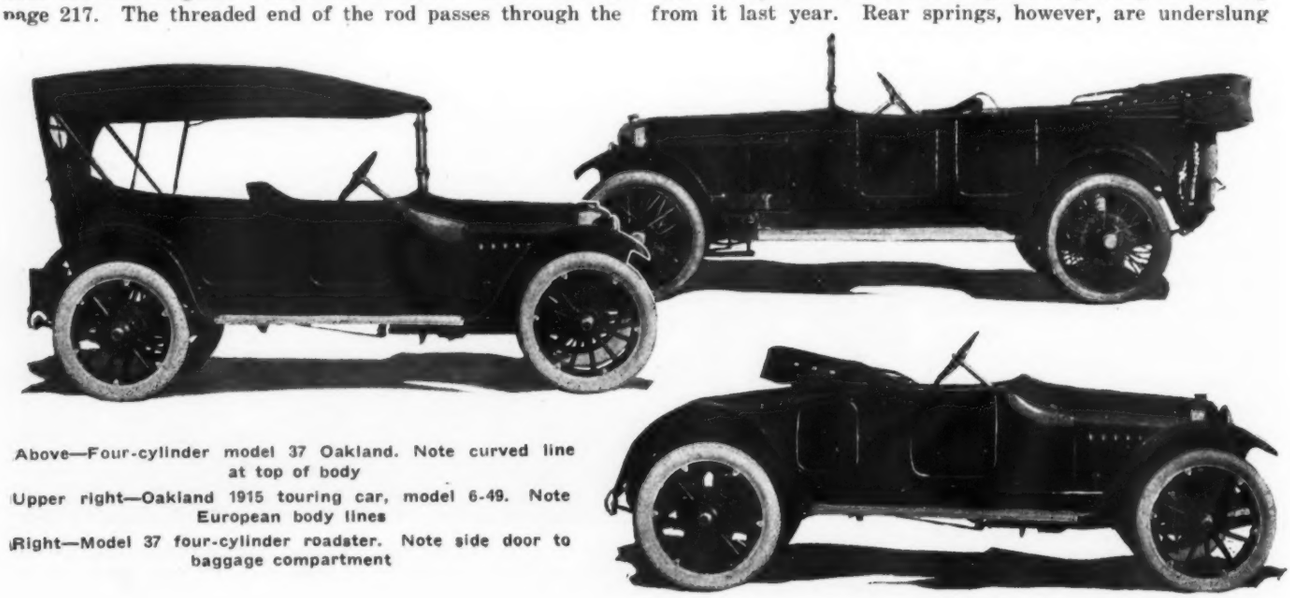
The rear axle is a one-bearing, floating type and replaces the three-quarter floating design of last year. Axle shafts and gears are nickel steel, and Hyatt bearings are used in wheels and differential with New Departures in the third member.

The frame is of entirely new form, and made to be directly under the side panels of the body, all along, giving it proper support, and eliminating the necessity of using side aprons on the car.

The frame channel is 4 1-4 inches high of 5-32 inch stock. It is 139 inches long over all, has a 4 5-8 inch kick-up at the rear and tapers to the front. The rails are 40 3-4 inches apart and parallel at the rear for 36 inches. Here is located a cross member, and ahead of it the narrowing commences, following the body line forward until at the front the rails are 30 inches apart.

Front Springs Overslung—Rear Underslung

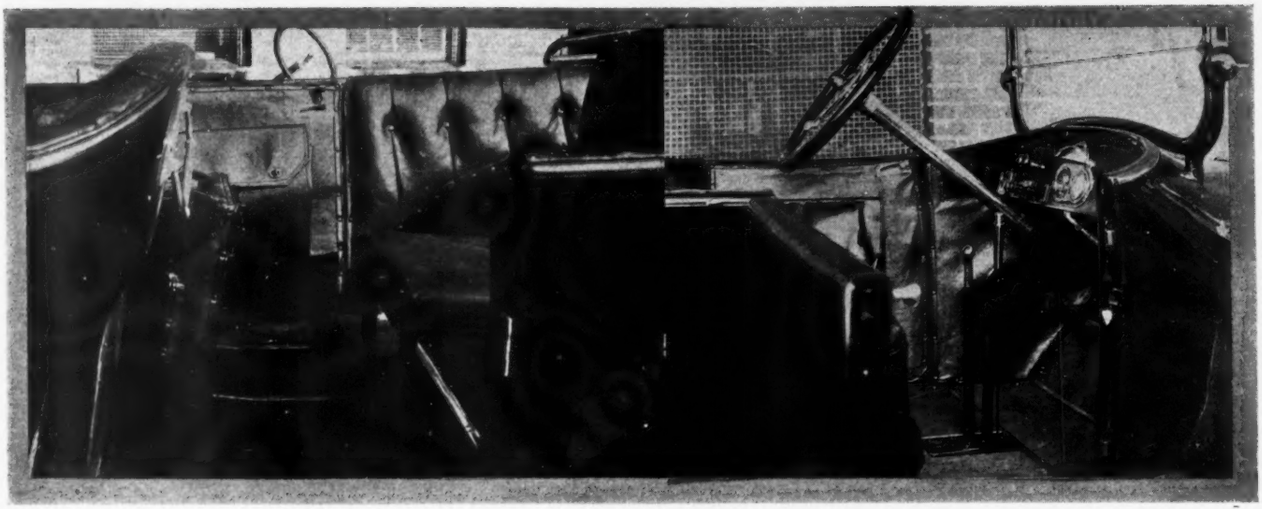
The springs are mounted directly under the frame rails, and not on overhanging brackets, which are heavy and put considerable strain on the cross-members. The scroll at the rear is directly through the gusset plate. The front springs have been placed over the axle again, they being underslung from it last year. Rear springs, however, are underslung



Above—Four-cylinder model 37 Oakland. Note curved line at top of body

Upper right—Oakland 1915 touring car, model 6-49. Note European body lines

Right—Model 37 four-cylinder roadster. Note side door to baggage compartment



Left—Auxiliary tonneau seats of six-cylinder Oakland. Note upholstery on sides. Right—Dash and control of 1915 Model 37 four-cylinder Oakland

as formerly. Fronts are 35 1-4 inches long and rears 48 inches.

The wheelbase is unchanged at 112 inches, and tires are 33 by 4 inches on demountable rims. The equipment includes a one-man top, rain-vision, ventilating windshield, and all other features of the modern car.

Concealed door hinges and a wider rear seat are provided, while the upholstering is new in that the tufted edges do not protrude over the sides of the car as they formerly did. This is in line with a growing tendency in the newer cars. A roadster body is offered as well as the touring car.

Six-Cylinder Model Six-49 Chassis

The six-cylinder Oakland is fitted with either the touring car body, which will carry seven, due to the addition of auxiliary disappearing tonneau seats, or with roadster or speedster body. Its wheelbase is still 123 1-2 inches.

The motor has come in for the same improvements as those enumerated for the four. The bore and stroke are the same, the cylinders are cast in a block with detachable heads, and the crankshaft has four main bearings. The general engine design throughout is the same as that of the four.

Chassis Is Unchanged

Equipped with a three-speed gearset, cone clutch, unin-closed drive shaft and floating rear axle, the car is really a continuation of last year so far as the chassis is concerned. Springs are underslung both front and rear and measure 41 1-4 and 50 7-8 inches in length, respectively.

Tires are 35 by 4 1-2 inches in size on demountable rims, and equipment is complete. Like the smaller car, the vacuum fuel feed is used, and the Delco electrical unit with its new features is also fitted.

Big Field for Cars in South Africa

DETROIT, MICH., July 26—C. H. Dunlap, export manager of the Hupp Motor Car Co., who has returned to Detroit after an absence of 22 weeks spent in investigating sales conditions of the motor industry in South Africa, states that there is a very good future for the automobile industry in South Africa, and that there is not a foreign country where motor cars can be used to greater advantage. The reason is due to the very poor railroads that there are throughout the Union. The lack of transportation facilities makes it necessary for the South African to use some other means of locomotion than the ox-cart, and right here is where the automobile steps in.

Commercial travelers use motor cars in great quantities. They help develop their territory and enable them to call on small towns surrounding the large cities. Mine operators use motor cars extensively, and even the Boer farmers, who live in the interior and who formerly went to town two or three times a year, now are able to make regular trips to the big cities, and it is uncommon when a week goes by and a farmer does not go to town.

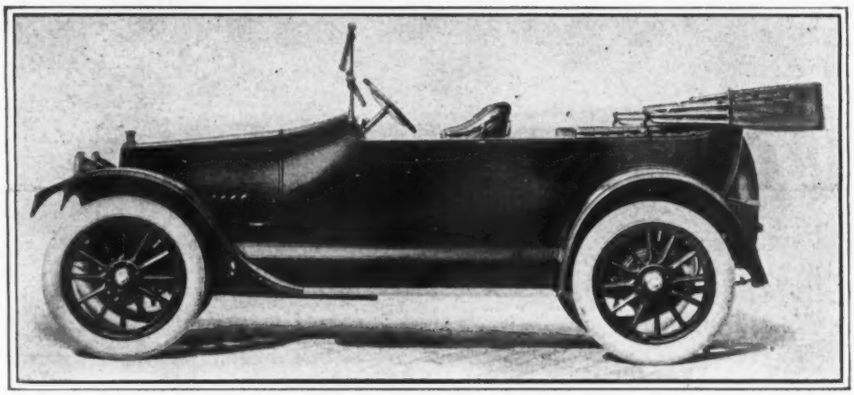
The roads around the large cities of Cape Town, Johannesburg, Port Elizabeth and Pretoria are in very excellent condition. Roads outlying the cities to any great extent are very poor and in many sections there are no roads at all—one has to run right across the "veldts."

There is a project on foot which has been sanctioned by the Colonial government, to establish good roads and improve roads now through the country, for which five million dollars has been appropriated. This work of road improvement has already been started

Front view of 1915 Oakland, showing streamlines of the hood and body and V radiator

New Mitchell Light Four at $1,250

4 by 5 1-2 Inch Motor of L-Head Type with Cylinders Cast in Pairs— Unusual Equipment



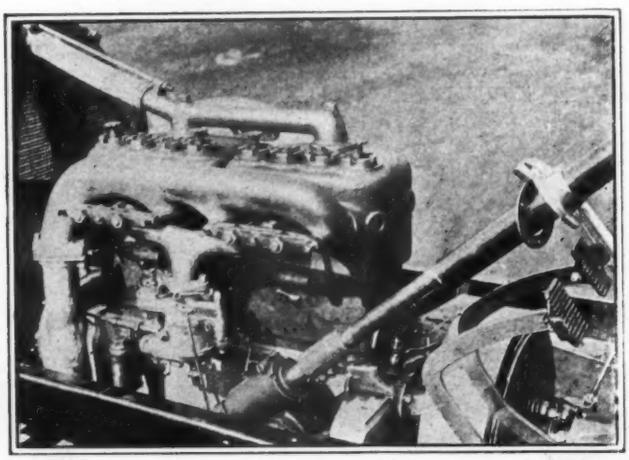
Side view of Mitchell Little Four for 1915 selling at $1,250

A FOUR-CYLINDER, 35-horsepower car at $1,250 with liberal equipment and with constructional features making for easy and inexpensive maintenance is the feature of the Mitchell line for 1915. The more powerful and more expensive chassis models, the Special Four, the Special Six and De Luxe Six upon which two, five, six and seven-passenger bodies and closed bodies are fitted, are continued practically unchanged for 1915.

The Mitchell line is now complete with a line of models ranging from 30 to 60 horsepower and well fitted to cover the greatly broadened selling field in which the company is now prepared to compete. The older models are too well known to require description here. Interest centers in the new Little Four.

Unusually Large Water Jackets

The Little Four has a four-cylinder engine of 4 inches bore and 5 1-2 inches stroke. The cylinders are cast in pairs and are of the L-head type with unusually large waterjackets. The engine has pump cooling, and ignition is obtained from the storage battery and generator of the Mitchell cranking and lighting system. The engine drives through a very accessible cone clutch of new design to a gearset amidships which gives three speeds forward. From here the drive is taken through a shaft in a torque tube and a single universal joint in the floating axle.



Left side of motor of Little Four, showing manifold attachment and collar holding two-piece steering column. Note that exhaust manifold leads to the front of the motor, down and then back

The drive is on the left and the control is center. The wheelbase is 116 inches and tires are 34 by 4 inches. Two-, five- and six-passenger bodies are fitted as stock at present, although coupé, sedan and limousine bodies may be obtained later.

Features of the equipment, in addition to that usually found on a car of this price classification, include a one-man top, ignition lock, headlight dimmer, and magnetic inspection lamp.

Cylinders are light castings. The L-head design of cylinders is a departure from previous Mitchell practice. This permits all the valves to be placed on one side and to be driven by a single camshaft. Pair casting of the cylinders permits neatness of cover placing and accessibility of the valve mechanism.

Pistons are flat-topped, with three eccentric rings. Piston weight has been kept to the lowest possible figure, consistent with strength.

Connecting-rods, like the pistons, are very light and strong, being drop-forged in an I-section from a special analysis steel that is both rigid and tough. The bearings of the piston pins are heavy-duty, dense bronze bushings, which work on hardened steel hollow pins. The bearings are 2 inches long and 1 7-32 inches in diameter. Woodruff keys keep the pins from turning and from shifting endwise by disk-like brass protectors interposed between their ends and the walls of the cylinders. As these are not attached in any way to the pistons, unequal expansion between the cast iron and the steel cannot cause distortion and wear of the pistons. Connecting-rod bearings are 2 1-8 inches in diameter and 2 3-8 inches long.

All Moving Parts Carefully Balanced

Special care is taken in the balancing of the reciprocating parts, so that there will be no vibration at high motor speeds. As each motor is assembled, the various reciprocating parts are paired off and finished to a balance that is exact.

The three bearings of the crankshaft are 2 1-8 inches in diameter. The bearing at the flywheel is 4 inches long, the others being 2 3-8 inches in length. All bearings are wet ground to finish, while permanent alignment and smooth running are insured by the stiffness of the aluminum crankcase which is obtained by special webs. The crankshaft is offset 1 inch from the center line of the cylinders.

Crankcases are of the barrel type without a parting on the bearing line, so that a pressed sheet-steel undercover, in which the oil troughs for the connecting-rods are formed, can be removed for inspection or adjustment of the bearings without disturbing the crankshaft.

Valves are one-piece alloy steel with hardened and ground stems and are of the non-warping type. They are 1 3-4 inches clear, opening with seats beveled at the angle of 45 degrees. The inlet valve lift is 35-64 inch, and the exhaust 13-32 inch. Valve push rods are single pieces of hardened and ground steel with mushroom heads. The adjustment is effected by simple cap screws with case hardened heads and check-nuts, and the entire valve mechanism is completely inclosed in chambers covered by stamped steel plates, and removable by hand. Valve spring washers are held in place by V-shaped retainers instead of the ordinary key which requires that the valve stems be slotted.

Cams are integral with the camshaft, and the cams and bearing surfaces are deeply carbonized, hardened and ground to form. A pair of steel gears with helical teeth are used for the camshaft drive. These gears have faces 7-8 inch in width.

There are three camshaft bearings, each of which is 1 inch in diameter, the front being 2 9-16 inches long and the others 2 1-4 inches. To permit adjustment for wear and distribution gearing, the front and rear camshaft bearings are supported in eccentric bushings which can be turned to bring the camshaft and this gear closer to the other timing gear.

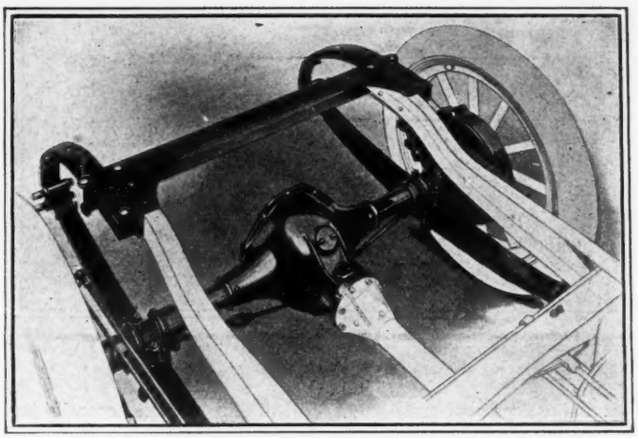
Three-Point Suspension for Motor

Three-point support is employed on the engine, the crankcase resting at the front upon the front cross-member of the frame, while at the rear it is extended into two arms which rest on the side sills of the frame. This three-point suspension avoids distortion of the motor through frame-twisting over rough roads.

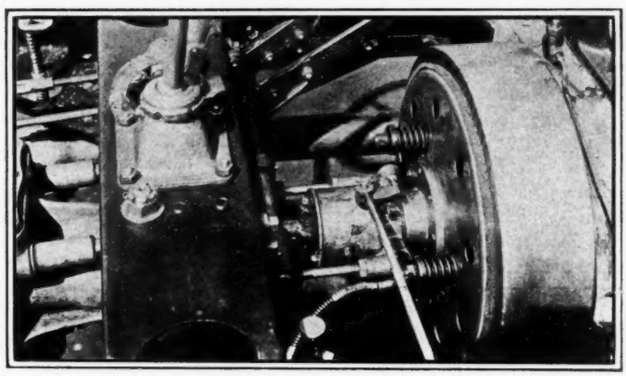
The oil reservoir of the crankcase is formed by the lower cover, which also is used as an inspection plate. The cover is a steel stamping made in two compartments, the lower half is the oil reservoir, and the upper half is fitted with an overflow and troughed for the connecting-rod apron. The system as a whole is a combination circulating splash which has been employed in Mitchell engines for many years.

Starting, lighting and ignition are well taken care of by the Mitchell single electrical system. A single-unit motor generator is carried on the right side of the crankcase and driven by a silent chain completely inclosed in the cast distribution gearcase. The motor generator is hung from trunnions at either end and can be lifted out of its cradle. It is geared at a low driving ratio, only 2.6 turns of the starting motor to one of the crankshaft. The generating function is so arranged that at a car speed of 8 miles per hour the generator is delivering 6 amperes to the storage battery, it is stated. The latter is located on the running board where it does not interfere with getting in or out of the car, but at the same time is handy enough so that the owner will give it the needed attention. Ignition is supplied by battery and generator current through a coil and distributer mounted accessibly upon the engine and driven through a special shaft.

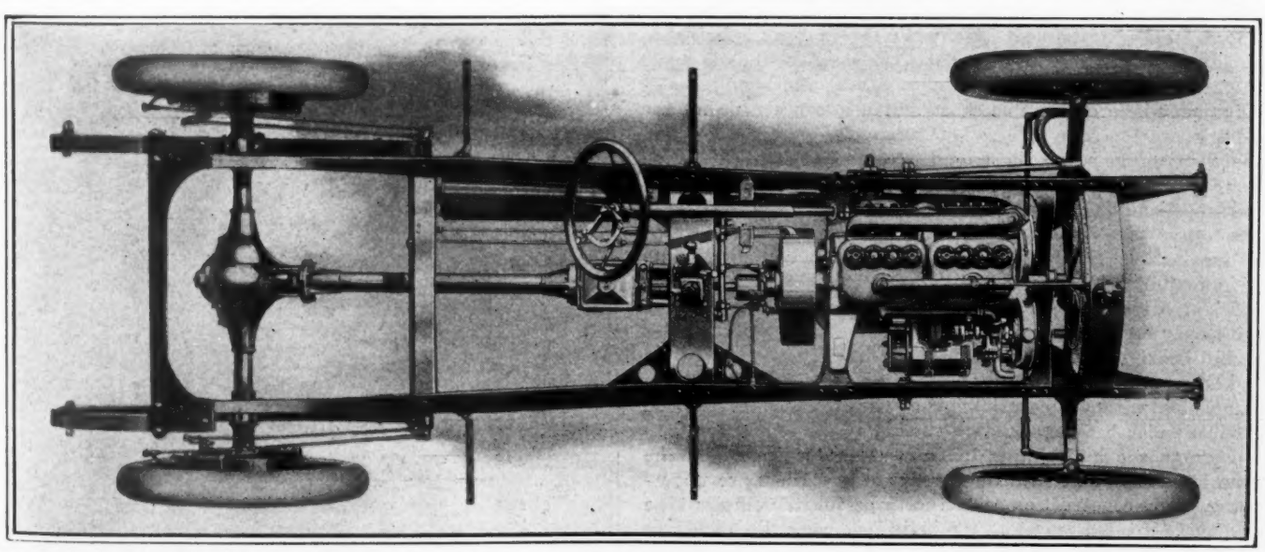
Inlet and exhaust manifolds are both held in the cylinders



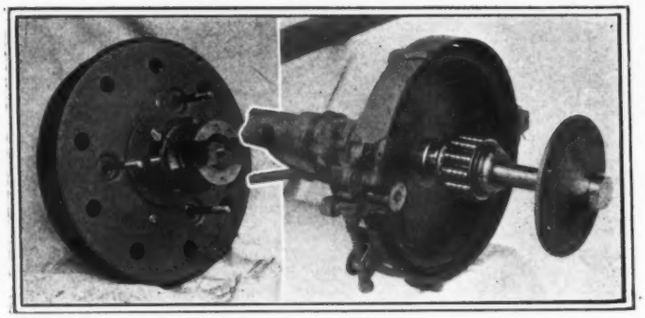
Rear construction of Mitchell Little Four for 1915



Method of mounting gearshift and emergency levers on crosspiece of frame in Mitchell Little Four. Also adjustment of cone clutch and flexible conduit carrying oil to clutch from motor



Plan view of Mitchell Little Four chassis. Note mounting of Mitchell electrical system at right of motor; also accessible gearbox with hand cover plate



6—Left—Clutch, showing bolts and joint. Right—Interior view of brake drum, showing hub plate of wheel and roller bearing

by a single pair of steel yokes, and to improve the accessibility of the motor the exhaust manifold discharges at the forward end, instead of the rear. This has the additional feature that the objectionable heat under the driver's seat is eliminated, and the hot exhaust is carried directly up to the coolest part of the engine just back of the fan, the air from which cools down the exhaust and assists very much in muffling it without back pressure.

Cooling is by a thin tubular radiator, and the connections to the waterjackets on the cylinders, which are exceptionally ample, are by two outlet tapered manifolds, with heat-proof steam hose between engine and radiator to facilitate this assembly. The radiator is braced by a short rod paralleling the hose to the motor.

Another feature of simplicity is the arrangement of the fan and water pump. The 18-inch, four-bladed fan with a shrouded rim is a one-piece steel stamping. The high-speed centrifugal pump is mounted upon the front end of the fan shaft, where it is accessible close to the radiator and driven without extra mechanism. The fan and pump are driven by a single endless belt with provision for keeping it tight. An important feature of arrangement is the fact that if the pump is permitted to freeze in cold weather nothing worse can happen than momentary slipping of the fan belt.

Propeller Shaft Is Entirely Inclosed

Transmission of power from engine to axle is a continuation of that system employed on older models of Mitchell cars. Its characteristic feature is the division of the power plant into two units, one the motor and its accessories and the clutch, the other the gearset, propeller shaft and rear axle. The important novelty, however, comes in the complete inclosure of the propeller shaft in the torque tube, which is bolted rigidly to the rear axle, while the gearbox is bolted to the front end of the torque tube. The gearbox thus is made a part of the rear axle unit in so far as the perfection of alignment inherent in this construction is concerned, but the addition to the rear axle weight is avoided, and the gearbox merely trunnioned on the frame. Instead of direct trunnion bearings the gearbox is trunnioned by short links so that the thrust of the drive is taken by the springs. A slip joint on the torque tube permits freedom to the twisting action which is inevitable. Suitably placed universal and sliding joints give flexibility between clutch and gearbox.

Final drive is by a bevel pinion and gear, both provided with easy adjustment and with ball thrusts as well as roller radial bearings to carry the loads.

The rear axle is of the floating type, driving shafts are removable without disturbing the wheels which revolve on flexible roller bearings, on the outside of the axle proper.

Springs are half-elliptic in front, 2 inches wide, and the nine levers are 3-16 inch thick. The rear springs are underslung. The construction is of the three-quarter elliptic type and there are ten leaves in the main member 2 1-4 inches in width.

Service and emergency brakes work on pressed-steel wheel-drums, which are 14 inches in diameter with a 2-inch base. The hand brake is internal and the foot brake is external, both faced with non-burnable fabric, and both quickly adjustable without disassembling. The brake adjustment is particularly easy, turnbuckles being provided on the rod and a locked, yet easily operated, adjustment at the drum.

Demountable Rims Are Stock

Demountable rims are stock equipment, and the tires, 34 by 4, are amply large for the weight of the car with its normal load. Either standard or 60-inch tread is optional, and to effect a change from one to the other it is necessary only to interchange the Mitchell patented hub.

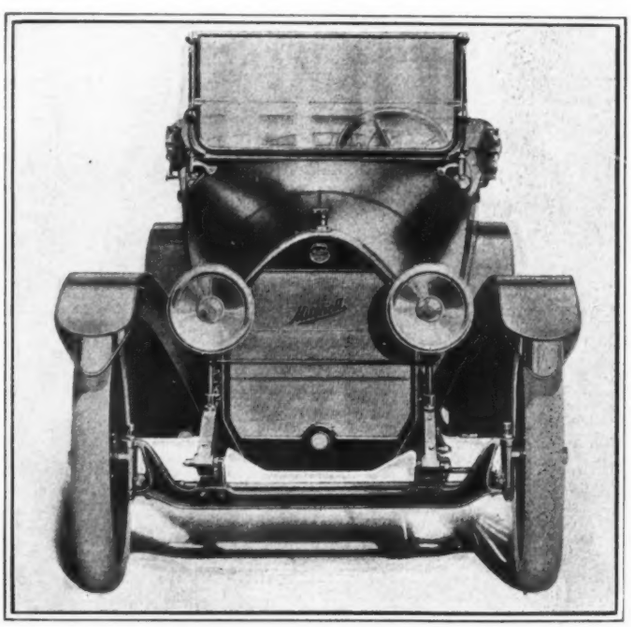
The irreversible steering mechanism is constituted of a worm and a full gear on a squared shaft, combining safety with durability, in that there is no sector to run past the worm and lock, while turning the gear into four positions affords four renewals of the wearing surfaces.

Gear and emergency brake levers are in the center of the car to the driver's right, and far enough forward to allow the occupants of the front seats to leave or enter the car easily from either side. The gear lever is of the rocking type, without a gate.

Fuel Tank in the Cowl

All of the indicating devices and instruments are mounted on the cowlboard, back of which, beneath the deep scuttle dash, is the 18-gallon fuel tank, with its filler opening accessibly placed behind the glass front. Also in the cowlboard are the priming pump for starting the 60-mile speedometer; ignition switch, with Yale lock to prevent theft; gasoline gauge; oil gauge, and switches for the lamps. Over the speedometer is a lamp, which pulls out at the end of a flexible cord, long enough to allow inspection of any part of the car.

A unique feature of the Mitchell Little Four is the arrangement of the button which operates the concealed electric horn. The button is placed on the door at the left side in such a position that it can be operated by either the operator's knee or his hand. The difficulty of wiring attending the installation of a button on the swinging door was overcome by using the hinges as a part of the horn wiring, the hinges being insulated from the ground and from each other so the concealed wires simply are brought to the hinge on either side.



7—Front view of Little Four and Special Six

The Engineering Digest

Compression as a Factor in Motor Economics — Its Terminology Corrected and Defined

RELATIONS TO SELF-IGNITION AND PISTON STROKE

COMPRESSION of the explosive mixture in an automobile motor is an element apparently so simple that all can aspire to understand how it works. It is therefore misunderstood considerably among motorists at those minor points which most easily escape attention; and these become the main points the moment the question is one of special refinements in motor design. Having discovered that this is the situation and that a slipshod understanding of the matter has spread even to builders of motors and is represented in construction and in the printed explanations of construction, Louis Lacoin, whose work on Construction and Regulation of Internal Combustion Motors is recently being quoted widely, gives a clear exposition of the whole subject, and one well suited for setting popular misconceptions aright and making it easier to explain certain features in motors of advanced design. The influence of the valve-timing on the degree of compression, the existing confusion in the terms used for designating compression and the effect of long-stroke motor design, constitute the principal points to which he calls attention. His presentation is rendered in substance in the following:

The Troubled Terminology

Strong compression is now looked upon as an indication of high efficiency, and as a rule it is true that the higher the compression is with which a motor can work the better is the motor. It should be added, though, that the real difference between the highest compressions used in practice and the smallest is much more modest than the figures proclaimed by the makers would lead one to suppose. This is due to confusion in terms. When it comes to measuring compression exactly, some makers take the proportion between the volume of the combustion chamber and that of the whole cylinder as a basis while others prefer to designate the compression by the pressure reached in the combustion chamber at the end of the compression stroke. As a matter of fact, though pressure is increased when the volume of the gas is reduced, it is not increased exactly in the same proportion but more rapidly.

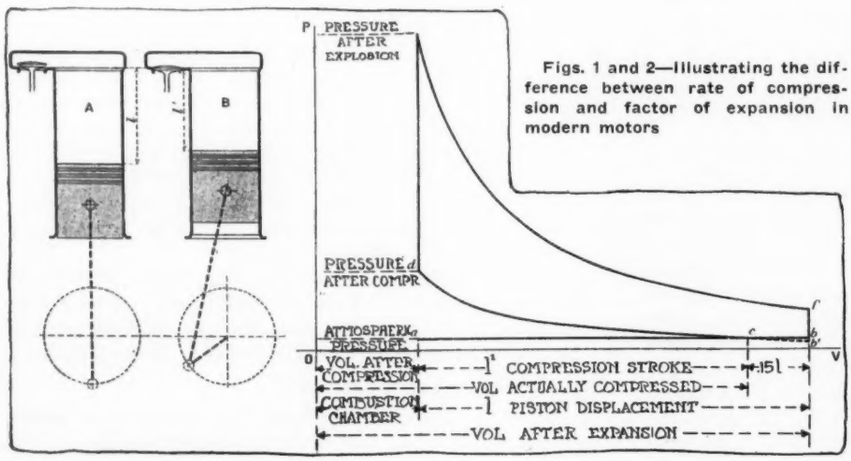
In practice both ways of expression are of interest. The proportion in volumes is indispensable for guiding the shop in shaping the combustion chamber to the right volume and capacity, while the pressure determines the forces to which the organs of the motor will be subjected; and the designer must know it for his calculations.

Both expressions are therefore legitimate, and, for that matter, one can be found from the other. But it is necessary to indicate which one is employed, as the difference is great. For an example, suppose the initial volume of gas is 4.25 times larger than the final volume, which is a proportion commonly used. In such a motor the pressure at the end of the compression stroke is 6.56 times its initial value. If then two persons discuss the subject and one claims to compress 6 times and the other admits that he does not exceed 4.25, it may be the second who uses the higher compression, if he speaks of volumes and his friend of pressures.

Merely to specify whether there is question of volumes or pressure is unfortunately not sufficient for disposing of the uncertainty. Each of these terms is subject to certain misundertandings. Continuing to use a motor with a volume proportion of 4.25 as an example, we have, as already mentioned, a pressure at the end of the compression stroke 6.56 times greater than at the beginning. If the latter is taken as the unit, the figure of the compression is consequently just 6.56. But the unit may be considered to be the average pressure of 1 atmosphere, which is equal to the pressure of a column of mercury 760 millimeters high in a barometer and amounts to 1.033 kilogram per square centimeter. On this basis the compression, while still 6.56 times greater than at the beginning of the compression stroke, will be expressed as 6.78, meaning 6.78 kilograms per square centimeter. Finally, by reading the pressure directly by means of a manometer, a figure is obtained which depends upon the actual atmospheric pressure. If the barometer is high—at 785, for example—the initial pressure will be 1.067 kilogram per square centimeter and the final pressure will reach 7 kilograms.

Still another mode of expressing the value of the pressure is in common use. It is characterized by leaving out of consideration the initial pressure, on the ground that the compression stroke does not produce it. Accordingly as this initial pressure is now taken as unit, as average atmospheric pressure or as actual atmospheric pressure, three other values must in that case be given as the measurement of the compression; namely, 5.56, 5.75 or 5.93.

At least six different figures may thus be used for indicating the final pressure caused by compressing the same gas mixture in the same motor. For a motor operated with producer-gas six different and higher figures could similarly be employed for measuring exactly the same rate of compression.



Figs. 1 and 2—Illustrating the difference between rate of compression and factor of expansion in modern motors

When volume is made the basis for the measurement, there is less occasion for confusion. Figs. 1 and 2 show the volumes which enter for consideration. The definition of what is here called the Rate of Compression is absolutely precise. It is the proportion between volume *B*, being the volume existing when all communication between the cylinder and the atmosphere is just cut off, and the smallest volume to which the charge is compressed. If the intake valve were closed at the lower dead center the Rate of Compression would equal the maximum cylinder volume, being the volume of piston displacement plus volume of the combustion chamber, divided by the volume of the combustion chamber, but in all modern motors the volume *B* remaining at the beginning of the compression is in reality smaller than *A* because the inlet valve is not closed till long after the low dead center has been passed. The true Rate of Compression is therefore smaller than the maximum divided by the minimum cylinder contents, though this value is what is frequently taken as the measurement. The proportion of the gross volumes represents on the other hand another important factor in motor economy; namely, the Factor of Expansion for the gases after an explosion.

Prolonged Expansion

Motors in which the Factor of Expansion is greater than the Rate of Compression are known as motors with Prolonged Expansion. To examine the conditions under which such a motor operates, let it be supposed that the inlet valve is closed 45 degrees after the low dead center. The piston has in that case covered about 15 per cent. of its course before the real compression begins. If at this moment the proportion in volumes is still 4.25; that is, if the true Rate of Compression is equal to this figure, the Factor of Expansion is equal to 4.824, which is an appreciably higher figure.

With a delay of the valve opening corresponding to 25 per cent. of the piston stroke—not yet used in common practice but nowise exaggerated—the Factor of Expansion corresponding to the 4.25 Rate of Compression would even reach the figure 5.333.

The term Volumetric Compression, as used by Letombe, denotes exactly the same that is here understood by Rate of Compression, but the latter term is preferable because it calls for a definition and can therefore not so easily be employed unthinkingly.

Premature Ignition

As has now been seen, the same degree of compression may be denoted by six different figures, when the tension of the gas is made the basis, and by two different figures, if volumes are made the basis; in all eight different modes of telling what a certain compression amounts to are recognized. Of all these only the two denoting the Rate of Compression and the Factor of Expansion are of real interest, as the former represents the element which the chance of premature ignition truly limits and the latter almost exclusively determines the fuel efficiency of the motor. All the pressure figures, on the other hand, may be determined one from the other when the Rate of Compression and the nature of the gas are known.

With the question of terminology settled one can progress to the other question which has so far been discussed rather vaguely; namely, how premature ignition limits the rate of compression.

It is customary to charge premature ignition to the presence in the cylinder of points which have remained at igniting-temperature after the expulsion of the burnt gases. This explanation is only half satisfactory. Especially, such points should certainly be hotter at the beginning of the admission of gas than toward the end of the compression stroke. They should therefore be more liable to ignite the mixture the moment it is introduced than later. They may be the cause of carbureter fires—nothing being more probable—but it is safe to contend that, as a rule, they do not cause premature ignition. If they did, all that would be necessary for making use of very high compressions would be to eliminate them, as shall now be shown.

During the compression the temperature of the gas increases, as well understood. In Diesel motors this increase of their temperature is sufficient to ignite them. Is the condition the same in automobile motors?

Arithmetic of Temperatures

It seems that the reply should be in the negative, as the rates of compression are so different. The Diesel rate exceeds 14; that of automobile motors rarely gets above 4.5. Now, for this rate of compression of 4.5 the proportion in *absolute* temperatures before and after compression is only 1.57. If then, at the end of the admission, the new mixture has the same temperature as the atmosphere, which is a reasonable assumption, and this temperature is 15 degrees centigrade, being 288 (273 plus 15) degrees absolute, the temperature at the end of the compression will be 1.57 times higher than 288, which is 452 degrees absolute or 179 degrees centigrade (452 minus 273).

But the lowest temperature at which a hydrocarbon gas mixture ignites spontaneously is about 450 degrees centigrade. Compression as such is thus far from being sufficient to produce ignition.

The reason for premature ignition must be sought in part in some other factor. There is the actual temperature of the gas mixture at the beginning of compression. It is in reality higher than that of the atmosphere. A certain proportion of burnt gases remains after the previous explosion, still very hot. Its presence raises the average temperature at the end of the induction stroke to 72 degrees centigrade, and the compression carries the total mixture, according to the above manner of calculation, to 269 degrees. This is 90 degrees higher than the figure considered before, but still not sufficient for causing ignition. Suppose, however, that in some quiet and hot corner of the mechanism, in contact with the exhaust valve or its seat, for example, there remains an ever so small portion of explosive mixture which reaches a temperature of 200 degrees centigrade before the compression, then the compression may raise this small portion to the 450 degrees required for spontaneous ignition, whereafter the whole charge will take fire from it. (In fact 200 degrees centigrade equals 473 degrees absolute, which multiplied by 1.57 makes 723 degrees absolute, and this is just the same as 450 degrees centigrade).

It is difficult to prevent the temperature of 200 degrees centigrade from existing at one point or another, and therefore the 4.5 rate of compression is barely practicable.

The Smooth Combustion Chamber

In order to reduce as much as possible the chance for self-ignition it would be necessary to cool the exhaust valves as thoroughly as the rest, which is difficult with the present methods of cooling. It is also needful to shape the combustion chamber so that the gas mixture may continue the course which it follows at its precipitous entrance by way of the admission valve. The whole mass of gas would then take one mean temperature and perhaps a rather high one, but there would be no recess with stagnant air much hotter than the rest. This is the authentic advantage of the semi-spherical combustion chamber.

It has also been established that the free circulation of the incoming mixture and the churning which results from such a movement accelerates the flame propagation started by the spark, producing fuller diagrams, better efficiency.

What Better Cooling Would Do

It is interesting to investigate and see what improvements would follow if some day a more equable cooling of the

cylinder were realized. Suppose that the gas mixture at the beginning of the compression were uniformly at a temperature of 122 degrees centigrade. The figure is reasonable, as the unexpelled exhaust gas carries it to 72 degrees and 50 degrees may be added as coming from the heated walls.

These 122 degrees centigrade equal 395 degrees absolute, and the proportion to this of the 723 absolute degrees which stand for the ignition temperature is 1.830 and corresponds, according to the existing tables on the subject, to a permissible rate of compression of 7.5, which is considerably higher than the customary 4.5.

With regard to fuel efficiency the progress would be notable: The theoretical thermic efficiency for the rate of 4.5 is 36.3 per cent.; with a rate of 7.5 it would reach 45.4 per cent., being a gain of 25 per cent.

With regard to power, with the same cylinder dimensions and the same fuel consumption, a motor of 20 horsepower would give 25.

Increased Stroke Taking Place of Compression

All this is still in the realm of speculation. At the present day only very small motors, whose thin cylinder walls admit of a lower interior temperature, can exceed a compression rate of 4.25. But when this rate is adopted and the combustion chamber is established accordingly, there is nothing to hinder an increase of the piston stroke, and thus gaining a large factor of expansion, so long as the inlet valve is forced to remain open long enough. (The author has shown in another article the advantages in fuel economy to be gained by this method.) The efficiency to be obtained in this manner is almost as high as if the compression rate were equal to the factor of expansion. Figures relating to a motor of the dimensions given in Figs. 1 and 2 will show this more plainly.

Without prolonged expansion a compression rate of 4.25 gives only a theoretical thermic efficiency of 35.2 per cent., while a compression rate of 4.824, which would equal the factor of expansion, would carry this efficiency to 37.6 per cent. Knowing that this rate of compression is not practicable we content ourselves with the 4.25 rate and prolong the expansion, as said, giving to this factor instead of to the compression the proportion of 4.824. The efficiency differs very little from what it would be in the other case, reaching 37.5 per cent.

So far as fuel efficiency is concerned, the rate of compression is thus immaterial. It is only the factor of expansion that matters. With regard to the power developed, on the other hand, the influence of the rate of compression is preponderant.

For example—making use of the same figures as before—a motor without prolonged expansion and with a compression of 4.25 gives 20 horsepower with a certain cylinder volume. If the cylinder volume remains unchanged but the rate of compression is increased to 4.824, without prolonging the expansion, the power is raised to 21.35 horsepower. But if the same motor, as it was with the 4.25 compression, is given a factor of expansion of 4.824, the power is reduced, for the same bore and stroke as before, to 18.75 horsepower, because the volume of the explosive mixture has been diminished. It is necessary to lengthen the stroke to get back to the same power, and the motor is then a little heavier, but it consumes less fuel. The increased weight may be offset by the smaller weight of fuel to be carried, at least for long trips, and the economy at all events would be appreciable, as for every 100 francs worth of gasoline used with the shorter stroke to produce a given power, the motor with the longer stroke and the prolonged expansion would require only 93.5 francs worth.

Summarizing: We should aim in our motors at the same time for a high rate of compression, to make them powerful and compact, and for a high factor of expansion, to make them economical, and when we talk about their characteristics we should mention not only their rate of compression but also their factor of expansion, these being data of equal importance and not to be confounded.—From *Omnia*, July 11.

Motors with Steel Cylinders Now Made Economically in Berlin

VERY few steel cylinders are used for automobile motors. Those made in the past have usually been smooth cylinders with welded heads and separate water-jackets. In building up motors with them the cost was high and the production laborious by reason of the many parts to be fitted, and the strength was not always reliable on account of the number of welds used. The Stahl-Motoren Gesellschaft Ernst Jaenisch & Co. of Berlin builds steel motors on a different plan, writes Fritz Klinkenberg, and has done so for some time, developing quite new methods.

The main product is block motors of the approved automobile type, and economy in the production is attained mainly by extensive use of modern factory arrangements and machine tools. The accompanying illustration, Fig. 3, gives views, mainly in section, of one of the types produced, which is a normal four-cylinder block motor, so far as the general design is concerned, with 80-millimeter bore and 130-millimeter stroke, developing 10 German tax-horsepower. The principal dimensions are marked on the cut, representing in some instances the chief point of interest.

(*Continued on page* 241.)

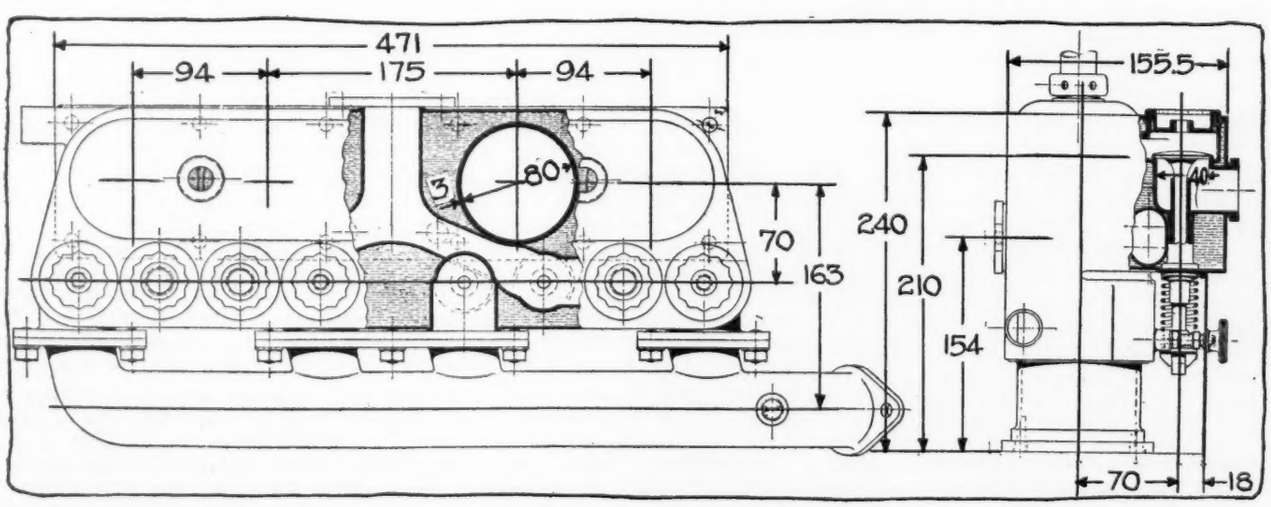


Fig. 3—Views, mostly in section, showing features of Jaenisch steel motors—in this case with cylinders of 80 mm. bore and 130 mm. stroke

Racing Is a Battle of Valve Systems---Knight

The Automobile Engineers' Forum

Inventor of Sleeve-Valve Motor Quotes Performance of Poppet and Non-Poppet Types in Tourist Trophy Race on Isle of Man—Racing Motors Must Reach 3,000 R. P. M. for Modern Racing

COVENTRY, ENG., July 4th—Road racing among automobiles has today resolved itself down largely to a battle of the valving system, namely, the side-poppet valve, the overhead poppet valve and the double-sleeve valve.

The recent 2-day Tourist Trophy race in which three Minerva cars with double-sleeve valves comprised the only team of three to finish in the race, has demonstrated that the sleeve-valve has possibilities in racing which have not been considered to date.

Contrary to the general assumption of would-be motor experts, the double reciprocating sleeves are not the limiting factor for power and speed in a motor, when designed and constructed the same as the high-speed poppet valve motors for speed work alone.

Special Knight Motors for High-Speed Work

The three Minervas which finished the Tourist Trophy race were the first examples of Knight sleeve-valve motors which have been designed especially for high-speed work, these motors having the weight of the reciprocating parts reduced, port area increased, and lubrication methods adequate for racing demands used.

These motors are a slight departure from standard sleeve-valve design in order to increase the port area, and consequently add to the capacity for high speed and power. A bottom exhaust port is added to permit for as much space in the top of the sleeves being used for intake ports.

Further, two eccentric shafts instead of one are employed for reciprocating in the sleeves. There is an eccentric shaft in either side, the shaft on one side operating the four inner sleeves and that on the other side operating the four outer sleeves. The two shafts are used to secure lightness and strength in the sleeves. Steel pistons are used, and pressure lubrication employed.

Smoke Could Have Been Eliminated

The protest against the three Minervas emitting too much smoke during the race emanated from one source only. The majority of the drivers of other cars refused to sign this smoke protest, but signed a remonstrance against it, and the committee, after investgating the matter, rejected the protest. While it is my candid opinion that no high-speed, four-cycle motor can ever be made a commercial success, with a bottom exhaust port because of loss of oil any more than can a four-valve-in-the-head poppet type become practical, yet the objectionable emission of smoke from the three Tourist Trophy Minerva engines could and would have been eliminated for racing purposes had time permitted.

Sixteen 6-Mile Mountain Climbs

The facts remain that in the Isle of Man race are sixteen terrible mountain climbs of over 6 miles each, wherein the motors were turning over at 3,000 revolutions per minute and this required a different adjustment of the lubricating system from that ever contemplated at the Minerva works by the designer. This mountain-climbing work required a maximum of lubricant, and owing to the design of system this maximum could not be varied upon the level and down grades without complete re-designing of the entire mechanism, which, of course, was impossible.

Other cars did not smoke so much at times, nor did they with three exceptions out of nineteen, succeed in surmounting this mountain the necessary sixteen times in succession to a height of over 1,500 feet.

Engine Trouble Put Out Many Cars

Practically all of the poppet valve designs in this race were equipped with four valves per cylinder, and the severity of the race shows how these failed in the early parts of the contest, which was eight laps per day around a circuit of 37.5 miles. In the first lap three cars were eliminated from two teams, namely, two Vauxhalls and one Sunbeam, all with engine trouble. The second lap was just as disastrous, two German Adlers and one of the three Humbers going out with engine trouble. When thirteen laps were over the three Vauxhalls, three Humbers, three Adlers, two Stars, two Sunbeams, one Crossley, one Straker-Squire, and one S. A. V. A. were out, leaving Sunbeam leading, Minervas in second and third, and another Minerva battling for fourth place with a Straker-Squire.

No Adjustment to Two Sleeve Valve Cars

In short, in the field of twenty-two starters, of which nine were of the sixteen-valve-in-the-head construction, but a single one of that new type had withstood the rigors of thirteen successive laps; of the ten side-pocket poppet types, two remained in the race, whereas all three sleeve-valve types remained in the contest. Not a single adjustment of any sort was made to two of the Minerva cars, the bonnets not even being raised before starting on the second day's race. The other Minerva had a broken oil pipe, which compelled it to slow down but not to actually stop in the race.

Fastest Cars Were the Finishers

This Tourist Trophy race contained many interesting facts relative to motor mechanisms. It demonstrated that the fastest cars were not the ones to be eliminated but rather that they were the finishers in the race. The accompanying table shows that Sunbeam I was the fastest car, making a circuit at the average 59.3 miles per hour; Minerva III was second fastest, Minerva I third fastest, etc. In a word, the fastest cars, with the exception of Sunbeam III, finished the race in about the order of their capacity for speed, whereas, many might argue that the fastest cars would suffer more

from break-downs or accidents than those which covered the course at a materially lower rate of speed.

Motors Must Make 3,000 R.P.M.

An inspection of the designs of the motors in the recent French Grand Prix race, as well as those in the Tourist Trophy race, will reveal the limits of efficiency of present engine construction. Engines capable only of under 3,000 revolutions per minute stand no chance whatever in first-class competitions today. No motor, with large bore, has any chance of standing up under the severe heat and tremendous piston travel of these high speeds. Ball bearings are being employed generally in crankshafts with as much view to eliminating bearing troubles as reducing friction, but the question of the operation of valves at high speed is coming prominently to the front, and receiving principal attention.

Overhead Valves Mean Lifting Cylinder for Trouble

No designer of a poppet valve motor today would think of bringing forward to compete for speed any motor with other than overhead valve construction, with the accompanying spherical combustion chamber, for the reason that the limit of valve area of the side pocket type has been reached, and that construction is completely abandoned for racing, the same as side chain drive for the road wheels in a passenger car.

But the overhead valve racing design introduces a most disturbing uncertainty and many complications aggravated by the tremendous stresses placed upon it by the enormous speed and pressures met with. The breaking of one of the sixteen valves in the valve-in-the-head construction means the elimination of the car as the cylinder must be lifted in order to replace a valve. The cylinder must be raised to grind any of the sixteen valves, and the best designers can only meet this argument by promising to make the valves unbreakable and so that they will require but little grinding.

Table of the Tourist Trophy Race Held on the Isle of Man, Showing Record of Each Car and Difficult Character of Course

Car	Number of Circuits	Fastest Circuit, Time	Fastest Circuit, m.p.h.	Total Time
		Min. Sec.		Hr. Min. Sec.
Sunbeam I	16	37:55	59:3	10:37:49
Minerva III	16	38:18	58:7	10:57:38 1-5
Minerva I	16	39:10	57:42	11:40:44 3-5
Sunbeam III	12	39:15	57:30	Retired
Straker-Squire I	16	39:50	56:5	11:22:50 1-2
Minerva II	16	40:27	55:58	11:22:20
Straker-Squire II	9	41:12	54:00	Retired
Humber III	13	41:51	53:88	Retired
Star I	6	42:31	52:92	Retired
Vauxhall I	12	43:2	51:96	Retired
Star II	4	43:21	51:72	Retired
Humber I	10	43:24	51:68	Retired
Adler III	10	43:39	51:54	Retired
Crossley	10	44:7	50:94	Retired
S.A.V.A	2	44:48	50:28	Retired
D.F.P.	16	45:2	50:C0	12:24:15
Adler II	1	46:38	49:20	Retired
Humber II	1	46:47	49:00	Retired
Adler I	1	50:22	47:84	Retired

Stirrup Construction Uncertain

The use of the stirrup construction, whereby springs are eliminated, and the poppet valve is mechanically opened and closed by cam action, in order to get speeds of 3,000 revolutions per minute seems to introduce complications and on the surface it looks as if the remedy is worse than the disease.—CHARLES Y. KNIGHT.

Decisions of the Courts—Son Driving Car

By George F. Kaiser

NEW York Appellate Division hands down decision holding that a motor car owner is not liable when an accident occurs while the car is being driven by a person not acting for him.

An automobile, which was being driven by a 24-year-old son of the owner, ran down a man who was waiting for a surface car in a public street. The latter, having been somewhat severely injured, brought suit against the father for damages. It came out on the trial that the son lived with his family and that the automobile was used as a family car by the whole family. The son, however, was the only one who drove it, acting as a chauffeur for his father, or any other member of the family who wished to go out in the car. In addition to this, his father had given him the privilege of using the car on his own account whenever he so desired. At the time of the accident the son, using this privilege, had taken the car out and was driving a party of friends about town.

The Court held that, as the son was neither acting expressly or constructively as his father's agent at the time of the accident, and the car was not engaged in the father's use or service, the injured party's case should be dismissed; this, however, without prejudice to his right to sue the son.—*Heisenbuttel v. Meagher*, 147 *N. Y. Sup.* (*New York*) 1087.

Should Pass on Right

Pennsylvania Court holds that, under ordinary circumstances, a motorist should pass on the right of a vehicle or pedestrian coming in the opposite direction.

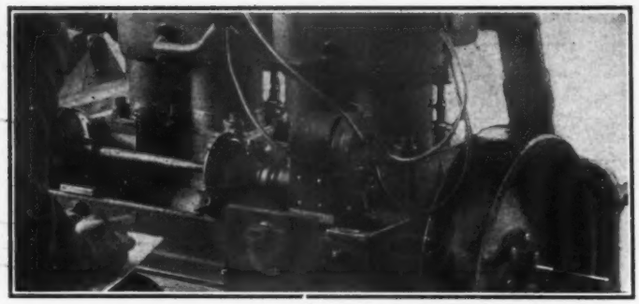
A motorcyclist who was struck and injured in a collision with an automobile while going west on the north side of Walnut street in Philadelphia sued the owner of the car for his injuries and succeeded in recovering judgment against the woman who owned the car, the Court holding that the chauffeur should have passed to the right instead of swerving over to the left of the street.

The chauffeur contended that a team was coming at a "terrible rate"; that he thought it was a runaway and was only trying to avoid a collision when he turned to the left side. The witnesses for the motorcyclist however stated that there was no team present at the time of the accident and the jury, adopting this view, found for him.—*Hazzard vs. Carstairs*, 90 *Atl.* 566.

Automobiles Not Liable to Tax

In a recent case in Idaho it was held that the State Legislature had the right to exempt motor vehicles from taxes by reason of the provision in the State's Constitution which gave them the power to exempt from taxes from time to time in any cases where such a procedure might seem necessary and just.

In this case a resident of Ada County petitioned for a mandate to compel the County Assessor and the Board of County Commissioners of that County to assess all motor vehicles that had escaped the 1913 tax under the Highway Commission Act. The petitioner was beaten, however, for the Court held that it was within the power of the Legislature to exempt automobiles, as there was a provision that registration fees of motor vehicles was to be in lieu of all taxes, general or local, it was only just to so exempt them.—*Achenbach vs. Kinkaid*, 140 *Pac.* (*Idaho*) 529.



The Rostrum

Thinks Two-Cycle Motors Are Passé

EDITOR THE AUTOMOBILE:—For some time I have been reading in the Rostrum the letters of people who are interested in the two-stroke cycle motor. It seems to me about time that some one else took a hand in the discussion.

Why should any one who has the benefit of modern experience and modern engineering progress wish to revert to the early days of the industry when the car was fortunate if it could cover 5 or 10 miles without breaking down?

Of course I don't say that all two-cycle engines are afflicted with this sort of trouble, but when the four-cycle type has attained its present development, with its smooth running qualities and even torque distribution, I cannot see why anyone should want to experience the sensations which I had when I was the fond (?) owner of an old Elmore which with its overlapping explosions, missing fire and ill-smelling exhaust used to haunt my waking hours and, like Macbeth, murder sleep.

Of course the principle of the two-cycle is very attractive, the simplification of parts, the absence of valves and several other factors render it of continued interest of those of an experimental turn of mind, but for the practical automobilist, it seems to me that it is foolish to waste time worrying about this type of construction. There are plenty of other things around an automobile that can be more readily improved upon and which the average car owner would be more likely to stand a chance of improving than this particular department of internal combustion engine construction.

If I am not sensible in putting forward these views on the subject I would like to hear from other motorists and perhaps from some of our engineers who are partial to motors of the two-cycle variety.

New York City. E. R. CRILLEY.

Holding Delicate Parts in a Vise

Editor THE AUTOMOBILE:—A mistake that a great many amateur automobile repairers make when working on a finished automobile part is to clamp the piece directly in a vise without any means of protection.

The sketch, Fig. 2, shows how a piston pin, for instance, should be held in order that the pin will retain its perfect original roundness. Place the pin between two blocks of soft pine, preferably, if wood is available. Any kind of wood is better than no wood at all. In fact almost any soft material may be used such as copper, lead, leather, and even a great many thicknesses of cloth. Remember that the jaws of a vise are hard.

This is about the best way to hold a threaded piece without ruining the threads.

Lead Keys for Light Work

Fig. 1 illustrates a carbureter lever that was originally made without a key or keyway, clamping means being provided by use of a split boss and screw as indicated. However, through carelessness one of the split projections was broken off as shown, rendering the lever useless. The lever was made good again by filing a keyway in the lever boss and chipping and filing a similar one in the shaft. The keyway thus made was a trifle larger than a piece of ordinary soldering wire, the latter being used for making the key. This was done by cutting off short pieces of solder and ramming them into the keyway "cold" by use of the tang of a file.

The lever is solidly fastened and there is little danger of it slipping off. The solder can be rammed in to almost any degree of tightness.

New York City. W. F. SCHAPHORST.

Some Starters for Ford Cars

Editor THE AUTOMOBILE:—Can you put me in communication with the maker of reliable self starter for a Ford car? I am in the market for a starter, electric preferred. Speaking candidly to you, I cannot walk, therefore drive my car with hand levers, and for this reason I am in need of a reliable self-starter. Will you advise if you can get a line on

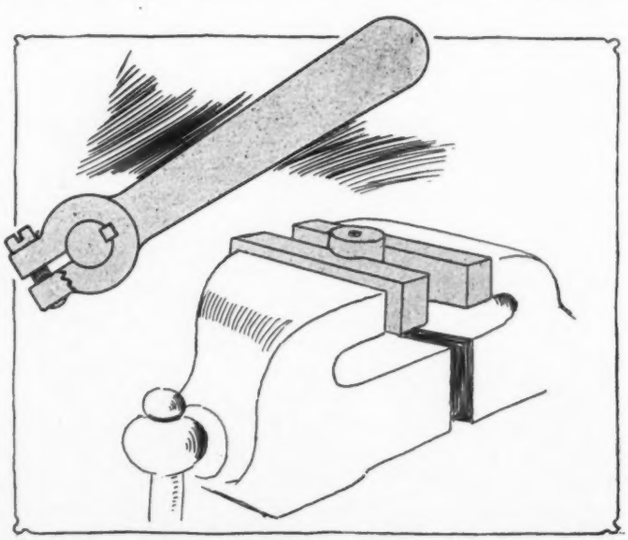


Fig. 1—Upper—Clamping a carbureter lever with a split boss and screw. Fig. 2—Lower—Using wooden blocks for holding delicate parts in a vise

the Detroit Electric Company starter called Deaco, and if said starter is put out by a concern that is reliable?

Warwick, N. Y. E. P. MAIDMENT.

—The Deaco is manufactured by the Detroit Electric Appliance Co., Detroit, Mich. As stated elsewhere in this issue, we cannot pass upon the merits of any given device.

Below is a list of the various types of starters made especially for Ford Cars together with the names and the addresses of the companies. The mechanical types, in which muscular power is required, have been omitted because this kind would be of no use to you.

Electrical starting systems similar to those employed on larger cars offer the advantage that the electric lighting of the car is obtained by the same system. Some of these systems have been produced in a form specially adapted for installation on the Ford.

Another type of engine starter is the compressed-air type in which the motor is made to store air under pressure in a tank, the air then being released into an air motor when it is desired to start. One of the advantages is that the compressed air thus provided always is at hand for tire inflation.

Starters of the spring type differ from those just described in that the engine itself stores up the power by which it subsequently is cranked. The rotation of the crankshaft in ordinary running winds up a spring which when released by the pressure of a foot button whirls the engine over rapidly. Such an one is the Ever Ready, made by the American Ever Ready Co., New York. It is attached in front of the radiator and takes the place of the starting crank. It is about the size of a headlight and looks like a headlight reversed.

A starter of the spring type is the Gardner, made by the Gardner Engine Starter Co., Chicago. This one is inserted in the transmission system, and the only part visible is the foot button which operates it. It is so arranged that after the start connections automatically are established for rewinding the spring.

Another starter designed for the Ford is the Knapp, a compression spring starter operated by a pedal which turns the engine direct on the magneto. The Knapp starter costs $25.00 and weighs less than 50 pounds. It is manufactured and sold by the Fawkes Auto Co., Minneapolis, Minn.

The Boston mechanical starter of the Automatic Appliance Co., Boston, Mass., is of the chain-pull type. It is so arranged that none of the apparatus is visible except the handle on the dash. C. E. Bridges, Chicago, has a pull-type starter which is installed easily. It sells for $12. The Perfection Auto Starter, Denver, Colo., has a pull-type starter operated by a pedal. Attachment is easy and the outfit is listed at $25.

Of the electric systems, one is the Fisher, made by the Fisher Electrical Works, Detroit, Mich. The equipment consists of a motor and generator mounted one above the other in a single housing, a storage battery box, wires, lighting and starting switches, ammeter, chain and sprockets and reflectors for the headlights. The claim is made for this outfit that it can be applied by the owner of the car and that without drilling a hole or altering any part of the engine. With a slight change in the starting crank it may be left in position.

One of the first concerns to market an electric cranking and lighting system for Ford cars is the Northeast Electric Co., Rochester, N. Y. The Ford apparatus consists of a motor-generator driven by silent chain from the crankshaft of the motor, suitable accessories such as brackets and fastenings, and a battery. In operation, pressure on a pedal causes the Ford engine to start, because the battery current flows through the cranking motor. When the engine picks up its cycle the pedal is released and the generator comes into play charging the battery.

A simple starting and lighting system for Ford cars is manufactured by the Detroit Electric Appliance Co., Detroit, Mich., which the owner of the car may himself install. A motor-generator driven by silent chain supplies the current when the car is operating at sufficient speed, but at low speeds, or when the motor is stopped, a battery attached to the running board furnishes the current. Pressure of the heel upon a pedal sends current from the battery to the starting motor, which in turn cranks the engine. All the terminals are marked in some way and the wires cut to exact size, so that the installation is a simple matter.

The Leece-Neville Co., Cleveland, O., has produced an electric starting and lighting system for Fords, designed for quick installation. The Gray & Davis Co. has announced a starting-lighting system for this car, which is very compact and can be installed in a few hours by any garageman. The feature of the system is that the Edison storage battery is used, by which means a lighter and more compact battery is obtained than is possible with the more common lead plates.

The Kellogg Mfg. Co., Rochester, N. Y., has brought out the Kellogg Air-Ford starter, with simplicity, efficiency and moderate cost as the aim. The Kellogg-starter is built under the Durno pattern. A four-cylinder Kellogg air pump is mounted conveniently upon the motor and driven by chain from a gear on the forward end of the crankshaft; this stores air in the storage tank, which upon the pressure of a button on the floor board is released to a starting cylinder which drives backward a piston in that cylinder, pulling a chain over a sprocket on the crankshaft.

The motor is turned so fast that one impulse turns it over several times. A spring returns the drum and prepares the starter for a second application of power. The outfit is supplied ready for attachment on the Ford at $70.

The Gemmer-Detroit Starter Co., Detroit, Mich., has a new air-starter system in which a single instrument performs the function of both the air compressor and the air motor. This combined motor-compressor is in reality a four-cylinder air pump mounted on the engine and driven from the timing gears. When running as a pump it stores up compressed air in a special tank which may be released either for tire inflation or for engine cranking. When air from the storage tank is admitted to the combination unit it runs as an air motor connected to the crankshaft of the engine by gears. Thus it spins the crankshaft at a speed of about 200 revolutions per minute. The total weight of the system is about

Fig. 2—Fireless cooker used as an extra seat

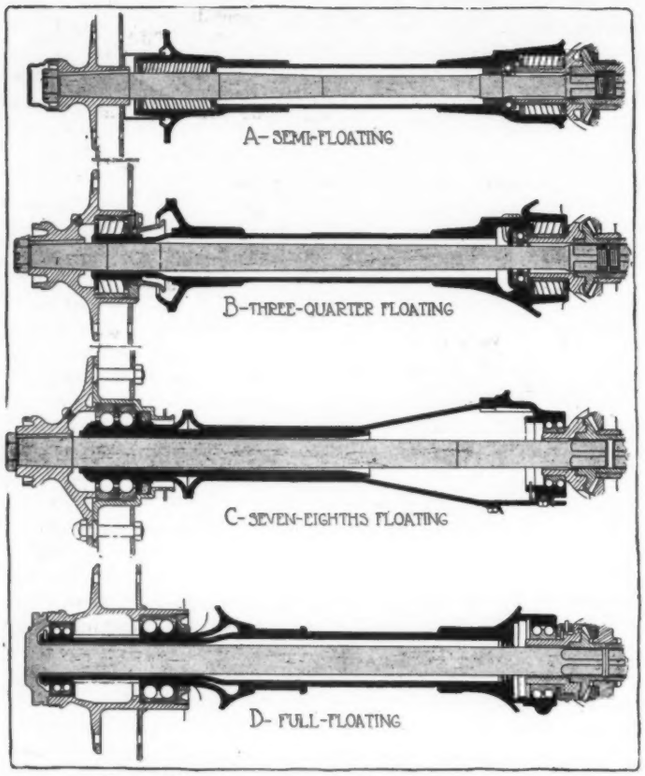


Fig. 3—Weston-Mott rear axle constructions, A is semi-floating, B is three-quarters, C is seven-eighths and D full-floating

35 pounds. A special installation has been developed for Ford cars, designed with a view to quick application.

Fireless Cooker for Seat

Editor THE AUTOMOBILE:—Fig. 2 shows an automobile which is equipped with a fireless cooker, which is used as an emergency seat for carrying extra passengers.

The owner of the car, who resides in Toledo, O., has a summer home at Lakeside, 50 miles distant. At the time of leaving home the cooker is pressed into service and upon arriving at the end of the route, the chicken or roast is ready for serving. To the owner and his family this cooker has been one of the most essential parts of the touring equipment. The cooker, having been made with an upholstered top, can be used as an extra seat.

Port Clinton, O. LOUIS P. WARNER.

Discard Radius Rods for Simplicity

Editor THE AUTOMOBILE:—1—Kindly state in your columns why so many manufacturers are using the rear springs to take the final drive through or why they are doing away with radius rods.

2—Give the pros and cons of the semi-floating and full-floating type axles.

New Matamoras, O. F. N. S.

—1—The principal reason for discarding the radius rods is simplicity. It is obvious that when the drive is taken directly by the springs that the manufacturer has saved on the cost of production and also reduced the number of wearing parts. Many manufacturers believe that the drive can be just as successfully transmitted through the springs as through radius rods, but as both constructions are widely used it is difficult to say which is better.

2—Below are two letters, one from the Weston-Mott Co., and the other from the Packard Motor Car Co., showing the advantages of semi-floating and full-floating axles. Last week the views of the Pierce-Arrow Motor Car Co. on this subject were given in a letter entitled, Pierce Prefers Semi-Floating Axle.

F. A. Bower, Chief Engineer of the Weston-Mott Co., says, "Fig. 3 shows the four types of axles, the semi-floating, three-quarter, seven-eighths and full-floating types, these being designated by the letters A, B, C, D, respectively. While the blueprint is explanatory in itself, we will try to show in detail the advantages of the three-quarter and full-floating types over the semi-floating.

"On semi-floating axles, the entire weight of the car comes directly on the axle shaft, which in time has a tendency to cause this shaft to crystallize and break. This condition is overcome, however, by making the shaft exceptionally strong to withstand crystallization.

"The three-quarter floating type, has all the advantages of the semi-floating on account of fastening the shaft at center of axle, but instead of taking the load on the shaft, it takes load on the axle housing. Therefore, the only strain thrown on the axle shaft on the three-quarter-floating type is the torque required to turn the wheels, and the shaft also assists to steady the wheel. This type is preferable to the semi-floating on this account, as any possibilities of shaft troubles are done away with.

"C shows the Weston-Mott single bearing hub full-floating type. On this type the shaft can be removed without jacking up car and it has all the advantages of the full-floating, shown in D, with the exception that the shaft helps to steady the wheel. The advantages of the type shown at C over the type shown at B is that the construction of C permits removal of the shaft. In B the hub and wheel only can be removed, but not the shaft.

"D shows the standard full-floating type of axle. This means that the only strain taken on the shaft is the torque required to turn the wheel. This shaft can also be removed by simply taking off the hub cap and pulling it out.

"Regarding the advantage of bolting the shaft at center of the axle over the type which slides into an intermediate hub—it may be stated that when a shaft is bolted, it is practically assured of always setting tight, but when the shaft slides into the hub, after continuous wear, it may develop a slight looseness. However, this is not a serious disadvantage, as this type of axle has been made for a considerable number of years and complaints as to wearing of shaft and causing looseness are very few. In fact, they are not enough to cause the slightest worry."

Semi-Floating Axle Lighter—Packard

Russel Huff, consulting engineer of the Packard Motor Car Co., in comparing the semi- and full-floating types states:

"The question of why the Packard company uses the semi-floating rear axle construction instead of the full-floating construction is oftentimes put up to Packard salesmen to explain. The following are some of the more important advantages and reasons why we use the semi-floating type of rear axle construction instead of the full-floating type on our touring cars:

"1—Weight—The full-floating type of rear axle design is heavier than the semi-floating type.

"2—Accessibility—In the Packard construction, the rear wheels can be removed much more easily and quickly than with the full-floating construction. The same thing that makes the wheel in full-floating construction difficult to remove, also makes it difficult to hold grease in this construction.

"3—Structural Points—The full-floating rear axle construction calls for the rear wheels to be mounted directly on the extension of the rear axle housing. In studying the two types, we anticipated serious trouble in cases where a car skidded into curbstones, or met with other similar accidents,

where the force was sufficient to break the wheel and bend the supporting member. In recent years we have seen several cases where the tubular extension, which carries the rear wheel in the full-floating type, has been bent by ordinary skidding into curbstones, and which called for an entire new rear axle housing simply because one end of it was slightly bent. Repairs for a slight accident of this kind with this construction might become very expensive; whereas in the semi-floating type of construction, like the Packard, nothing but the straight driving axle would be bent, and this can be replaced without great expense.

"4—Service Expense—We have also seen these tubular extensions in the full-floating construction broken off by crystallization from overload or ordinary fatigue, and here again the expense for a new housing is many times greater than would be the expense for a new axle which might break for the same reason.

"5—Bearings—The rear wheels in the full-floating construction are usually carried on two anti-friction bearings placed rather close together on the tubular housing extension. These bearings are subject to the same wear and tear as the front wheel bearings, and if not kept in close adjustment, produce a serious wobble to the wheels, which in time may cause the breakage of a driving axle. The semi-floating construction has a massive single bearing supporting the wheel near the hub, and a bearing in the differential in the center of the housing for keeping the axle in alignment.

"6—Driving Axles—The average full-floating type of rear axle now on the market does not have proper provision for securing the axle in driving position. We have seen many cases where the hub cap, which is designated to hold the axle in position, has been lost and has allowed the axle to work out of engagement with its driving members. It is no unusual sight to see cases on our streets where the driving axles are held in position by strings and wires because the hub cap has been lost.

"7—Use of Wire Wheels—It is almost impossible to get a good wire wheel installation on a full-floating rear axle. In order to accomplish it at all, it is necessary to have the driving clutches and the rear wheel bearings very small in diameter. If ample diameters, such as are standard on some of the well-known makes of cars using full-floating construction, were used, the wire wheel hub diameter necessary to slide over these would become too large to be practical for interchangeability between the front and rear wheels.

"8—Extra Universal Joints Required—The full-floating driving axle, to be practical and safe, should drive the rear wheel through some form of universal joint. All universal joints in an automobile eventually chafe and wear and produce a serious cluck and jerk in the transmission line, due to the increased lost motion of the worn parts. It has been the Packard idea from the beginning to reduce the number of universal joints in the transmission line to a minimum. This is one reason why we have the rear axle transmission and the semi-floating type of rear axle drive.

"This semi-floating construction is also used by the Pierce in this country, and the Renault and many others abroad."

Wants Information on Beach Records

Editor THE AUTOMOBILE:—To settle a wager will you please publish the records for miles made at Ormond Beach by Marriott in a steam car, and those made later by Burman and Oldfield with a Benz. Also the fastest time officially or unofficially made by Duray with a Fiat at Ostend. I think I have seen somewhere in print that in one of his trials he made a speed of 150 miles per hour.

Gibson, N. C. SUBSCRIBER.

—The fastest time made at Ormond for 2 miles was that of the Blitzen Benz driven by Burman on April 23, 1911. when he covered that distance in 51.28. Oldfield in the same car made that distance in 55.87. The Stanley steamer driven by Marriott made 2 miles in 59 3-5 seconds in 1906.

On December 16, 1914, Arthur Duray, in a 300-horsepower Fiat, attained a speed of 142 miles an hour in an attempt to secure the world's flying kilometer record. The attempt on this record was carried out on the shore road near Ostend.

Road Turns Marked with L or R

Editor THE AUTOMOBILE:—I have noticed several roads around South Bend, Ind., and have also followed their route to Albany, N. Y., and also up into Wisconsin. The turns of the route are marked with a large L or R as the turn may be to the left or right. The route and markings has appealed to me very much and I would like to know who is behind it and also who did the marking.

South Bend, Ind. CHAS. H. FRAZIER.

—The National Trail Blazing Assn. of St. Paul, Minn., is the association behind the marking of these routes.

Water Leaks from Pump Cups

Editor THE AUTOMOBILE:—1—Will you please tell me how to prevent water leaking out of the grease cups at either side of the water pump?

2—The spark lever on my car is very hard to turn, especially when the motor is hot. Where do you think the trouble is and how can I remedy it?

3—What is the best way to keep tires from sticking to the rims?

Albany, N. Y. J. H. H.

—1—You are using too light a grease in these grease cups with the result that when the motor gets warm the grease becomes very fluid and allows the water to leak. In hot weather you should use a heavy grease, probably the hardest that you can buy will be the most satisfactory. However, as soon as cold weather sets in substitute a lighter grease.

2—While this stiffness may be in any of the joints of the linkage operated by the spark lever, it is most likely that the breaker box is too tight a fit, so that when the motor becomes heated the expansion of the part on which it fits causes it to stick.

Disconnect the breaker box from the linkage and note whether it moves freely. If it does not, remove it and rub the interior surface with emery paper until enough material has been removed to allow it to work freely.

3—In order to keep the tires from sticking to the rims it is necessary to prevent the rusting of the rim and this is most satisfactorily accomplished by the use of flake graphite. The graphite is mixed into a creamy paste by adding a small percentage of gasoline. This is then applied to the rims the same as ordinary paint. The gasoline evaporates and leaves the graphite which not only prevents rusting to a large extent but holds the bead of the tire away from the metal of the rim.

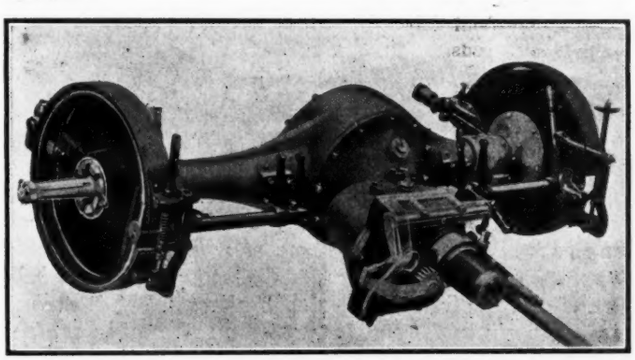


Fig. 3—Packard rear axle, showing semi-floating construction

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Rubber versus Rails

IT is significant that it is the president of one of the largest railway systems in the Middle West who has pointed out the importance which the automobile has attained in Iowa, which is also typical of its status in the other States of the Union.

He states that more than 100,000 *automobiles are licensed in Iowa and that the amount of money expended on them by the people annually is in excess of that spent for railroad travel inside the State. The automobile and public roads questions, according to this railroad president, have become more important to the public than the railroad question. People are more concerned with the price of rubber than with that of steel rails, more concerned with the cost of gasoline than with that of coal, more interested in having perfect highways than perfect railways.*

But what is more significant, this official looks for an element of consolation in this state of affairs and finds it. He points out that "the man who is concerned with many things is never narrow minded; the citizen who realizes the cost of maintaining and operating an automobile, the cost of perfect highways and their upkeep, also realizes what it means to maintain and operate a railroad; he will not deal broadly with one and narrowly with the other." Thus the development of one will aid the other.

Truck Users in Line

NOW that there is assured a convention of motor truck manufacturers in conjunction with motor truck dealers, why not go one step farther and invite the motor truck users to participate?

The successful operation of a truck depends on the manufacturer, the dealer and the owner. If one is a failure, the others can not reach that degree of success which they should. The interests of the maker and the dealer are very closely allied, but the field of the owner is equally close to them. Successful truck operation interests all three to such an extent that it might be advisable to consider having a day given over to the subject of truck owners' affairs.

There is a precedent for this in our national road organizations, which divide their sessions and give one day to road users, who take up those problems of first interest to them.

Truck Owners' Day would be a red letter one in a motor truck convention. The owner has many questions he would like to ask the truck maker and the truck dealer. There are many problems on so-called service that would be well threshed out if the owner, the dealer and the maker were in the same room at the same time and discussing this all-important subject. The owner could give the maker not a few points of interest and also give some facts of first-class value to the dealer. The owner would benefit because he would receive many criticisms and suggestions where designs could be improved and on the other hand the owner would realise the difficulties encountered by the truck manufacturer, and would not make unreasonable demands.

Then, there are problems in which all three are concerned. A union meeting of these three factors in the truck regime would solve many questions on driver difficulties, tire mileage, overloading, overspeeding, time payments, etc., that are bothering all parties and will continue to bother them until some get-together meeting of this kind takes place.

The truck owners' day could be fathered by some organization outside of the makers and dealers, preferably some club that would faithfully represent their interests. One thing is certain, namely, that if a score or more representatives of truck owners could be gotten to such a convention much good would result. It would be one of the best possible things for the truck interest. It would breed more confidence between owner and maker. Today there is too much doubt and too much uncertainty.

The owner doubts the work of the maker. He distrusts the vehicle, the guarantee and the service assurances. On the other hand the maker imagines the owner is attempting to destroy the truck as rapidly as possible. A little getting together will bring the maker and the owner on common ground. One will see that the other is human, and vice versa. Common interests will be discovered. The net result will be a better understanding, and the engendering of a spirit of unity for the motor truck industry that will be a most valuable asset to it. Let us see if the owner cannot be interested. A dozen owners might represent over 1,000 trucks.

239,902 Cars From 25 Detroit Plants in 6 Months

Output Is 77,902 Without Ford Production—1,258 Commercial Vehicles Built —Fifteen Make Over 1,000 Cars

DETROIT, MICH., July 27—According to information furnished by 25 manufacturers of automobiles in this city they have built during the first 6 months of 1914, that is between January 1 and June 30, a total of 239,902 cars.

Leaving out of these statistics the 162,000 cars made by the Ford Motor Company, there remains an output of 77,902 cars for the other 24 manufacturers.

Of the 25 concerns located in the Michigan automobile metropolis from whom data was obtained, 17 make pleasure vehicles and some of them also commercial vehicles; 5 are exclusive manufacturers of commercial cars and 3 make electric vehicles.

A total of 237,794 pleasure cars were made by the 17 companies. Not including the 162,000 cars made during the first 6 months of this year by the Ford Motor Company, the total number built by the other 16 manufacturers is 75,794.

The 5 commercial vehicle manufacturers built 1,258 delivery wagons and trucks. The three electric vehicle manufacturers reported having constructed 850 vehicles.

Of the 27 concerns having furnished information, one made more than 150,000 during the first 6 months of this year; 3 made more than 7,500 each; 4 made between 5,000 and 7,500 cars; 6 made between 2,000 and 5,000 cars, 3 made between 1,000 and 2,000 cars and 10 made less than 1,000 cars each.

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Europe Is Speed Mad—Heaslet

DETROIT, MICH., July 25—Vice-president and chief engineer J. G. Heaslet of the Studebaker Corp. returned a few days ago from an extensive trip through England, France and Germany, during which he made a close investigation of the trend in automobile construction abroad and the requirements of the foreign market in relation to American export business.

In speaking about his trip Mr. Heaslet said:

"Everyone is familiar with the fact that Europe has far better roads than America. There has been time to build them and the various countries over there are intersected with splendid highways. The result is that the European motor car owner drives at a far higher speed than the American motorist and he keeps his car going at a much greater average pace. Rough roads keep the speed low in America; good roads force it to the top notch in Europe.

"Consequently in Europe with the ultimate power of the engine almost constantly in use the driving parts are continuously subjected to the greatest strain and stress and these conditions are much harder on the car. Our rough roads may develop only rattles because of the bumps and jars; in Europe all the driving parts are put to the severest test and the whole car must prove its strength and durability or fail.

"This is a matter that must be seriously considered in manufacturing cars for European consumption and the ultimate car is the automobile that is capable of taking all types of stress—that will meet all requirements for both Europe and America.

"As soon as American roads are improved as they are in Europe, American and European standards will become more nearly identical, and this result will be more to the advantage of American manufacturers than to those of the old World, as American makers will then be able to build a quality car which more nearly comes up to European ideals and at a price with which foreign manufacturers cannot compete."

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P. K. Hexter Brings Out Stepless Bus

NEW YORK CITY, July 28—A stepless double-deck bus seating 38 people has been brought out by P. K. Hexter, New York City. The door is at the right side and the floor is so low that passengers can step, without difficulty, directly from the street into the bus. When the bus stops alongside the curb the floor is practically flush with the sidewalk.

Access to the upper deck, which is open, is had through a stairway that runs back from the side door. The conductor sits directly in front of the door and staircase. Accidents to passengers are largely eliminated because it is impossible to jump on or off the bus until the conductor opens the door. It is a very roomy design.

The chassis used is equipped with a 5 by 6-inch motor and the Hexter system of gasoline electric drive which was described in the October 9 issue of THE AUTOMOBILE, page 663. The gasoline motor and generator are mounted at the front while the electric driving motor is at the rear, the drive being transmitted to the axle by a worm gear. With the electrical form of transmission the floor can be placed as low as desired.

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New Franklins Lower in Price

SYRACUSE, N. Y., July 27—The most important feature of the announcement of the Series Six-Thirty by the H. H. Franklin Mfg. Co. is a substantial reduction in price. The touring car and roadster are to sell for $150 less, while the reduction on other models has been even more. The prices of the new machines are: Touring car and roadster, $2,150; coupe, $2,600; sedan, $3,000, and Berlin, $3,200.

In the new model the body is larger, the sides of the seats higher and the upholstery is finished off in a roll around the tops of the seats. A shutter effect is used in the front of the hood instead of the old type grill. Goodrich Silvertown cord tires or Goodyear Power Saver tires are now standard equipment. Increased silence has been obtained by using skew bevel gears in the rear axle. The starting and lighting system has been simplified and made lighter and more accessible. The weight, however, remains the same, 2,750 pounds.

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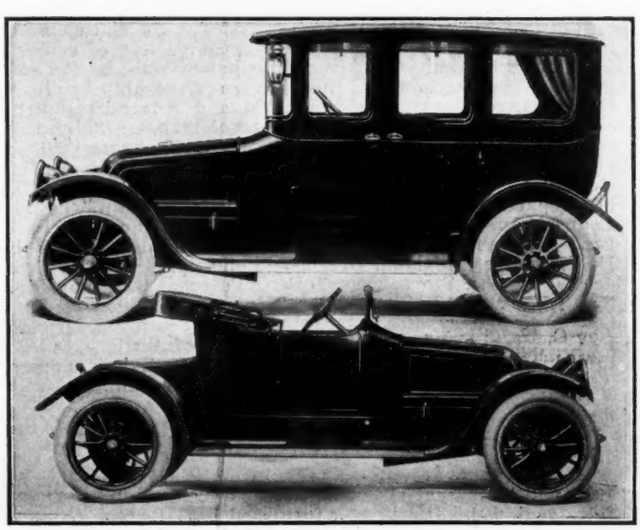
NEW YORK CITY, July 28—W. E. Fisk, secretary of the New York State Automobile Assn., and M. Rocomora, manager of the road guide department, have started from Hornell on a pathfinding tour through the state to meet the officers of the local automobile clubs to make final arrangements for the 1914 official tour of the state association, which commences August 31 and continues for over a month. This city is scheduled as one of the stopping points in the official tour of over 3,000 miles.



New Franklin Berlin and roadster models

Chalmers "Light 6" at $1850 —Dealers Vote $50 Raise

Convention of 500 Agents Also Boosts "Master Six" $125 to $2400— Guarantee for Second Hand Cars

DETROIT, MICH., July 25—The most important among the various decisions taken at the recent convention of dealers or representatives of the Chalmers Motor Company, Detroit, was the unanimous approval by the 450 to 500 agents present of the raise in price of the 1915 Chalmers cars, model 26B, the "Light Six" to cost $50 more or $1,850 and model 29, the "Master Six" to cost $125 more than the 1914 models, or $2,400.

This is rather surprising considering that most of the other automobile manufacturers who have announced their 1915 models made a reduction in their prices. "If the men who are to dispose of our output approve of our policy in increasing our prices instead of cutting them, it's a pretty good indication that they believe we are bringing out a car which is fully worth its price," said an official of the Chalmers company. "As we do not sell our cars on a consignment basis, as the dealers buy their supply of cars from us, it is quite natural that they would be the first ones to protest against a raising of the prices if they thought it unjustified. But just the contrary has happened."

Another important decision by the majority of the dealers was that hereafter second hand Chalmers cars will be sold by the dealers with a guarantee, just like new cars. In most cases used cars will be handled entirely separate just as if it were a different business.

The new Chalmers Dealers Service Policy was also adopted by all and will be of the greatest assistance to Chalmers owners and drivers, who will now be able to secure service from any Chalmers dealer in any part of the country, no matter where the owner or driver bought his car. For instance if a motorist bought his Chalmers in New York and is in Des Moines, Ia., requiring special service, he will get it from the local Chalmers agent. The new policy contains the following three clauses, in effect among all Chalmers dealers:

First.—It is our intention to give each and every purchaser of a Chalmers car fair and business-like treatment. Should any customer not receive such treatment, we ask in good faith to be advised.

Second.—We will make all necessary repairs and adjustments, without charge, for one month after delivery of car, provided car has not been tampered with or injured through accident.

Third.—We will install, without charge for labor, any parts that may be replaced as defective by the Chalmers Motor Company, or ourselves, for a period of ninety days after date of delivery of car; after such date, all work will be done in a careful and workmanlike manner and our regular charge made for same.

(Signed) Dealer.....

Many of the officials and dealers at the convention made informal speeches touching upon a great variety of subjects interesting the industry. Here is a list of some of the subjects: "The Automobile Business In General," by Hugh Chalmers, president; "Salesmanship and Advertising Principles," by Lee Owell, assistant general manger; "Manufacturing Methods," by H. H. Pinney, works manager; "Service and Engineering Principles," by Geo. W. Dunham, consulting engineer; "Advertising," by Lee Anderson, manager advertising department; "Selling Cars and Salesmanship," by Lee Counselman, general manager; "The Second Hand Car Problem," by James Levy, Chicago; "Service To Owners," by H. L. Keates, Portland, Oregon; "Following Up Sales Prospects," by Geo. Stove, New York; "Personal Salesmanship," by E. W. Wyckoff, Pittsburgh; "Maintaining Show Rooms," by J. J. Mandary, Rochester, N. Y.; "Educating Salesmen," by C. E. Whittin, Lynn, Mass.; "Covering Territory and Establishing Sub-dealers," by E. C. Anthony, San Francisco; "Service To Owners," by O. L. Weaver, Cleveland.

Haynes Light Six for $1,485

KOKOMO, IND., July 28—The feature of the Haynes line for 1915 will be a light six of 55 horsepower, to sell for $1,485, fully equipped. It will be furnished both in two and five-passenger body styles, will have left hand drive and center control, and will be fitted with the vacuum system of gasoline feed.

In addition to this model the Haynes Automobile Co. is offering a big six rated at 65 brake horsepower and selling for $2,250, and a four developing 48 horsepower and selling for $1,660. The light six is an entirely new model. The electric gearshift will be continued on the big six and the four, but it is not fitted to the light six. Closed bodies are fitted to the big six and the light four.

The weight of the light six, completely equipped, is 2,950 pounds and the wheelbase is 121 inches. A unit power plant with three-point suspension has been adopted and it includes an L-head block motor 3.5 by 5 inches, three-plate clutch and three-speed gearset. A full-floating rear axle is used and the springs are semi-elliptic all around. Artillery wood wheels are found.

New Brasie Co. To Make Cyclecars

MINNEAPOLIS, MINN., July 25—The Brasie Motor Car Co., 2743 Lyndale avenue S., Minneapolis, Minn., is a $100,000 corporation for the manufacture of automobiles and trucks. It takes the place of the former Brasie Motor Truck Co., which manufactured the Twin City truck. In its incorporation the company enlarges its scope and will make a cyclecar pleasure car and cyclecar delivery, as well as a trailer.

J. M. Michaelson, formerly maker of the Minneapolis motorcycle, the Shapiro-Michaelson motorcycle and the Michaelson cyclecar, has associated himself with the Brasies in the new company. As secretary he will have charge of sales and advertising. F. R. Brasie, president and treasurer, will control the purchasing and shop, and Mrs. (E. C.) Brassie is vice-president.

Delivery of trucks has begun, cyclecar deliveries will begin in thirty days and pleasure cars in sixty days. The latter is to be known as the Messenger and the former as the Packet, on the theory that the name should show the purpose of the cars. The car is adapted especially for mercantile men to take orders and collect money in the Messenger and to deliver goods in the Packet. The trailer is a 56-inch tread two-wheel cart on ball bearing wire wheels with pneumatic tires arranged to attach to the springs of a Ford or other light car, instead of the axle. The capacity is 400 pounds and the price $75.

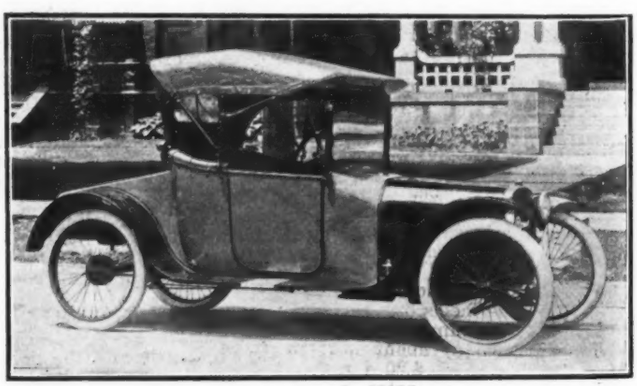
Until its air-cooled engine is perfect the company will make a chassis with a four-cycle, four-cylinder, water-cooled engine, with magneto ignition, friction transmission with belt drive to rear wheel. The wheels are wire, the tread 40 inches and wheel base 90 inches. The engine will develop 16 to 22-horsepower. The gasoline capacity is four gallons. The front springs are full elliptic and the rear semi-elliptic. The delivery car has a panel body 28 1-2 by 51 1-2 inches by 4 feet high and will carry thirty-six single grocery delivery boxes. The capacity is 400 pounds and the price $400. The weight is 900 pounds. The same chassis is used for the pleasure car which has a sociable seat. The cars are electric lighted.

The Twin City truck chassis will be continued at two-ton capacity at $1,350, with body to suit purchaser.

A Record 10 Months for National Company

INDIANAPOLIS, IND., July 25—The annual meeting of the stockholders of the National Motor Vehicle Co. was held this week. According to George M. Dickson, general manager, the season just closed has been an exceptionally good one.

"It has been customary to hold these annual meetings in



Light car made by the Herreshoff Motor Sales Co., Troy, N. Y.

September," said Dickson, "but we closed our fiscal year this season on June 30, which gave us only a 10 months' year. As soon as inventory could be completed our reports were ready and show that the last 10 months have been the most successful the National car has ever enjoyed."

Dickson has been associated with the National company in executive positions for many years. In fact, many of the heads of departments at the National have been there for years, a striking contrast to the changing personnel of other automobile concerns. The National factory is operating full time, and Dickson said that business is maintaining a good average.

When questioned about the properties adjoining the National factory, which have been acquired by that company, Mr. Dickson stated that they were not ready to announce the details of the new National buildings, but this year's successful business meant that there would be no curtailment and that the addition contemplated would go forward as planned.

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Illinois Garage Owners for Uniform Prices

DECATUR, ILL., July 28—One hundred garage owners from various points of Illinois assembled this week in Decatur to attend the convention of the Garage Owners' Assn. of Illinois, which was organized last winter in Chicago. William McGinley, president of the Decatur Automobile Club, delivered the address of welcome. He devoted considerable of his talk to the subject of good roads and tendered the association the co-operation of the Decatur club in any legislation that would work for the betterment of road conditions. Mr. McGinley was elected an honorary member of the association. Robert Bland of Chicago, president of the association, delivered one of the principal addresses of the convention. He referred to the drunken driver, the speed maniac and the man with so much money that he did not care how many fines he was assessed, as the three classes of the motorist who are a menace to the automobile industry as well as to society. It is these whom the garage owners association are fighting and they are to be found in all walks of life.

C. B. O'Hara of Chicago, discussed the various qualities of gasoline on the market and furnished some interesting observations on prices and variations in grades.

Sparta reported that the city and county had been completely organized, every garage owner being in line and that the result had been an agreement to establish uniform prices for gasoline and accessories, the combination ensuring better service for the public.

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Chalmers Absorbs Boston Distributor

BOSTON, MASS., July 25—On August 1 the Chalmers Motor Car Co. will take over the entire business of the Whitten-Gilmore Co., that has handled the Chalmers cars in Boston and vicinity for several years. The Whitten-Gilmore Co. will go out of business entirely and the partnership of Ernest A. Gilmore and Charles E. Whitten will be dissolved. Mr. Whitten has the agency for a line of cars and trucks at Lynn, Mass., that he will continue. Mr. Gilmore will take a vacation for some weeks before he does anything. Already a number of makers are trying to get him to take over an agency for their cars. The dissolution of the partnership will throw the agencies for the Saxon car and the Federal trucks on the market.

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Eastern Jeffery Distribition for Poertner Co.

NEW YORK CITY, July 27—The Poertner Motor Car Co. has been appointed eastern distributer for the Jeffery car, manufactured by the Thomas B. Jeffery Co., Kenosha, Wis. The Poertner company will continue to handle the National and Waverly cars. The salesrooms now located at 1922 Broadway will be removed to 1759 Broadway.

—

New York Taxicab Competition in Sight

NEW YORK CITY, July 28—The International Cab Co. will on October 1 begin operating taxicabs in this city with charges of $.25 for the first half mile and $.05 for each additional quarter mile, making $.35 for the first mile, and $.25 for additional miles. P. J. Holdsworth, formerly manager of the Yellow Taxicab Co., will be general manager of the new service.

Upon the heels of this announcement is the statement that the Mason-Seaman Transportation Co. will put 200 taxicabs into service at about half the present rates. This would make the tariff $.20 for the first half mile and $.05 each for additional quarter miles. These 200 cabs will be for public hacking only and will not respond to telephone orders. If the experiment is successful more cars will be employed.

New plant of Partin Mfg. Co., Chicago, Ill.

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Partin Co. Takes Over Staver Plant

CHICAGO, ILL., July 28—The Partin Mfg. Co., this city, has acquired the large automobile plant formerly operated by the Staver Automobile Co. at Auburn Park Station, Chicago.

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Chassis and Body Parts Given Drawback

WASHINGTON, D. C., July 23—A drawback allowance was today granted by the treasury department on the exportation of automobiles and automobile bodies manufactured by J. M. Quinby & Co., Newark, N. J., with the use of imported chassis, aluminum, hardware, metal fittings, plate glass, woolen carriage cloth, various kinds of laces, carpet, waterproofed fabrics for tops, leather, metal chains, rubber tires and other fabrics and materials.

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Briggs-Detroiter Dealers in Session

DETROIT, MICH., July 25—Beginning Monday, July 27, the annual convention of dealers handling the Briggs-Detroiter will take place under a big tent specially set up for that purpose on the factory grounds of the Briggs-Detroiter Co. "We expect such a large gathering that we could not take care of them in our offices," said one of the officials of the company. "Anyhow, with this warm weather the men will rather like the idea of being outdoors."

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Grossman Pays 100 Cents on the Dollar

NEW YORK CITY, July 27—The creditors' committee, which took charge of the Emil Grossman Mfg. Co., last January, has turned the business back to Emil Grossman unconditionally. At that time it was promised to pay 100 cents on the dollar and this obligation has been fulfilled.

The creditors' committee was appointed for the protection of creditors and customers on Jan. 20, and was due to the facts that the removal of the Grossman factories from New York and Detroit, the installation of additional machinery and equipment, the erection of three new buildings and two kilns at Trenton, N. J., proved a tremendous drain on the cash resources as a result of not producing goods for 2 months.

Notwithstanding the disadvantages under which the Grossman company has been operating it is stated that substantial increases in both business and profits have been made and it is stated that 348 manufacturers have contracted for Red Head spark plugs alone.

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Hayden Is Pullman General Manager

YORK, PA., July 24—At a recent meeting of the stockholders of the Pullman Motor Car Co., this city, the following changes were made: H. W. Hayden, general manager; H. W. Conrad, sales manager; J. J. Croghan, auditor, and C. G. Swartz, superintendent.

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DETROIT, MICH., July 29—*Special Telegram*—The K. C. B. Co., with a capital of $200,000, has been organized here to bring out a new carbureter for heavy fuel. This company is a reorganization of the Chambray Carbureter Co. The incorporators are: J. H. Chambers, C. H. Bennett and A. A. Leslie, all officers of the Chambray company.

Recent meeting of San Francisco sales force of the Pacific KisselKar branch

A Test of Safety Signals by Life Protective Society

Danger of Rear-End Collisions Obviated by Devices Shown to N. Y. Safety First Society

NEW YORK CITY, July 25—A demonstration of a number of ways in which the driver of a car can make known to those behind him whether he intends turning right or left or stopping was held yesterday under the auspices of the Automobile Technical Sub-Committee on Street Traffic of the Safety First Society, New York. While most of the devices were thoroughly practical and worked well, only one or two have reached the stage where they are offered for sale.

The demonstration was held at 119th Street and Claremont Avenue and was divided into two parts. At 5 o'clock p. m. the daylight test was made and at 8:30 the dark test, in which the illuminating features were brought out. The cars carrying the signals were sent, one at a time, around the block, paced by a motorcycle and followed by the committee car. In all cases the signals did what was required of them. The Automobile Technical Sub-Committee consists of A. B. Cumner, Chairman; David Beecroft, Arthur J. Slade, George H. Robertson, Joseph Tracy and Frederick H. Elliott, Secretary.

The following brief descriptions of the devices shown will serve to give an idea of the many tentative solutions of the problem of eliminating the danger of accidents from rear-end collisions:

Walz Has Three Openings

The Walz Auto Direction Signal, shown by E. A. Walz, Jr., 505 Fifth avenue, consists of a metal casing attached to the rear of the car, having three glazed openings behind which are electric lights. Two of the openings are at right and left of the device, near the top, and are quite large, while the third, below them and in the middle is smaller, is fitted with a red lens and is the regulation tail-light. The larger openings are illuminated by the manipulation of a switch under the driver's control. When the one on the right is lighted up it shows an arrow-head pointing to the right, indicating that the car is about to turn to the right; on the other side the arrow of course points to the left. Illuminating both arrows at the same time indicates "stop."

The device exhibited by James M. Pugh, 1978 Bathgate avenue, Bronx, is of the shutter type, there being a horizontal row of metal slats that can be turned with either of their flat sides outward or edgewise. The flat sides are lettered "Left" and "Right" and the device is operated by magnets controlled by a switch under the driver's hand. An electric light illuminates the letters at night, and a red tail light is part of the device.

What looked like a diminutive railroad signal attached to the right rear fender was the signal devised by Lester D. Mayne, 110 W. 40th street, New York. An arm carrying three lenses in a row is pivoted to swing across the face of an electric light carried on a standard. The side lenses are lettered "L" for left, "R" for right and the middle one "S" for stop and the control, which is through a steel cable operated by a sort of selective lever working in a notched plate, causes the desired lens to be brought in front of the lamp. The lever is worked by pressure of the driver's arm, so that he does not have to take his hand from the steering wheel.

Signatelle—A Semaphore Type

The Signatelle was shown by Dr. Joseph Mandelbaum, 332 W. 145th street, New York, and is of the semaphore type in that when the driver is about to turn to right or left the signal throws up an arrow-shaped arm pointing in the proper direction and at the same time rings an electric bell. When the car is to stop a slide goes up revealing the word "Stop" in illuminated letters on a glass plate. At night the arrows each carry two small electric bulbs.

Auto Signalite Uses Cylinder

The Auto Signalite is of less recent vintage than most of the signals shown, being already on the market. It has a horizontal cylindrical casing with an opening through which the words "Right," "Left" and "Stop" appear when the roller device carrying the lettering is brought around by the driver. The device is made by the Auto Signalite Co., 737 Seventh avenue, New York.

The Grinden Art Metal Co., 427 Marcy avenue, Brooklyn, showed a signal with three glass panels, one on the right, one on the left and the third below the other two, with the necessary lettering for right, left and stop, the latter at the bottom. Lamps inside the casing illuminate the letters.

Gibson Has Two Lenses

William Gibson, 440 E. 156th street, New York, showed a lamp with two lenses one above the other and illuminated by the same lamp. The lower lens, which is green, is covered by a brass shield ordinarily, and the upper lens, which is red, left exposed as a tail light. When the car is to stop the green lens is uncovered automatically, being connected with the brakes so that a red light above a green one shows, railroad style.

The Au-To-C illuminator shown by Harry Searles, 1187 Halsey street, Brooklyn, is an illuminated license number, the figures being formed on glass and thrown into sharp relief by a lamp behind the glass.

Perhaps the most unusual signal in the lot was the Auto-Block, shown by Geo. A. Cole, of Hayes & Diefenderfer, 21 W. 62d street, New York. The signal is on the front of the car. There are two yellow disks, each about 4 inches in diameter, and each with an electric lamp in its center. The disks are on the ends of long spring steel strips which, when levers are moved, shoot out some eighteen inches or so and allow the lamp and disk to wave up and down in a rather startling manner. The signal can be seen from either front or rear because of its projection. Both disks out at once means stop.

Edward Stern, 40 W. 13th street, New York, showed the Nokolyd signal, which is of the illuminated type with lettered glass panels in front of an inclosed electric light. The signal was mounted on the right rear fender.

200 at Hupp Dealers Congress

DETROIT, MICH., July 25—The second annual Hupmobile convention will take place at the plant of the Hupp Motor Car Co., July 20 to August 1, with the presence of about 200 dealers who are expected from all over the country and abroad.

The programme is as follows:

July 30—Registration of dealers and informal reception of the dealers by President J. W. Drake. In the afternoon the dealers will be given a boat ride and supper at Bob-Lo.

July 31—Morning session: Talk on "The Medium-Priced Car Dealer Has a Staple Product," by F. J. Money, sales and advertising manager; "International Selling Methods," by C. H. Dunlap, general export manager; "Territorial Organizations," by A. C. Robbins, Los Angeles distributor; "Spirit of Service," by F. G. Fox; "Direct by Mail Advertising," by Palmer E. Winslow, advertising department; "Newspaper Advertising," by M. G. Ward, of the Dunlap-Ward Advertising Company; "Hupmobile Advertising Plans for 1915," by J. G. Roe, Hupp Motor Car Co., advertising department. Afternoon session: "The New Hupmobile Construction," by F. E. Watts, chief engineer; "Chassis and Electric Construction," by Don T. Hastings, assistant chief engineer. A detailed description will be given of the new car, and disassembled and assembled parts, etc., shown during the course of this lecture. Evening: Theater party at the Temple.

August 1—"Hupmobile Plant Organization and Factory Capacity," by S. H. Humphrey, manufacturing manager. Trip through the plant under Mr. Humphrey's direction. Further discussion on new models and display of new cars in factory sales rooms. Evening: Banquet at Hotel Pontchartrain.

Packard Uses Tungsten Valves

DETROIT, MICH., July 24.—In the July 16 issue of THE AUTOMOBILE it was stated that the valves in the Packard motors are nickel steel. This is an error, as the Packard valves are tungsten steel.

Coupe de l'Auto Course Picked in Auvergne

PARIS, July 15—Piston displacement has been reduced from 183 to 153 cubic inches for this year's *Coupe de l'Auto* race, and in order to make the event unusually difficult a mountainous course has been selected through Auvergne, where brakes will be an important factor. At present only nine entries have been received. These comprise three Mors cars, two Scap, one Pierron, and three Peugeots. These latter will be driven by Boillot, Goux and Rigal. It is announced that one of the Mors racers will be handled by Demogeot.

On the same day, and over the same course, it is intended to run a race for light cars having motors with a piston displacement of 85 cubic inches maximum.

Lindhe Sold Shim Patent Rights?

NEW YORK CITY, July 27—In the case of Eric G. Lindhe against the Laminated Shim Co., a bill of particulars has been filed by the defendant in answer to the motion for same, made July 3 by the plaintiff.

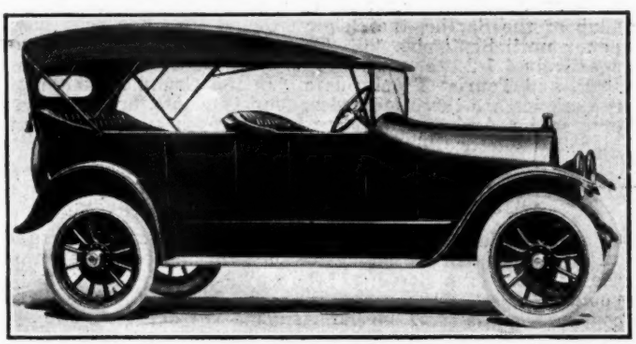
In this bill of particulars the defendant alleges that the contract, pursuant to which patent No. 969,709, covering the shim involved in the suit, was obtained and assigned to the Lindhe Shim Co., was a verbal one between William B. Nisbet, Theodore B. Nisbet and Carlton N. Aborn, who supplied the Lindhe Shim Co. finances, and Eric G. Lindhe, about August, 1910. The defendant further alleges that the said contract was employed to construct a special machine for the making of shims under the patent mentioned. This machine was made, according to the defendant, in April, 1911, before the application of Lindhe for the patent. The "authorization, full knowledge and consent" of the plaintiff to the sale of the patent rights of the Lindhe Shim Co. to Frederick P. Craig is said to be in writing and forms a part of the minutes of the Lindhe Shim Co. It is also alleged that the transfer from Frederick P. Craig to the Laminated Shim Co., Inc., of these rights is in writing and a matter of public record.

Convention of Jeffery Dealers Called

KENOSHA, WIS., July 27—Five hundred dealers representing all sections of the country will be in attendance at the Jeffery Chesterfield convention, to be held at Kenosha, August 4 and 5, at the factory of the Thomas B. Jeffery Co. The announcement of the Jeffery Chesterfield six, illustrated herewith, and which was described in THE AUTOMOBILE for July 23, will undoubtedly result in many changes in Jeffery representation in many sections of the country with new additions to the organization. Two days will be given to the assignment of territory to visiting dealers, the exhibition of the new cars and demonstration of the Jeffery Quad, the truck of Jeffery manufacture which has been adopted by the United States Government.

Chesterfield has 34 by 4 Inch Tires

In the description of the new Chesterfield Jeffery six which appeared in THE AUTOMOBILE for July 23 it was stated that 33 by 4-inch tires are used. This was a typographical error, as 34 by 4 tires are the correct size.



The new Jeffery Chesterfield six selling for $1,650, which is to be introduced to the dealers at the convention to be held at the factory August 4 and 5. The car uses 34 by 4-inch tires

Group of the district representatives of the Thomas B. Jeffery Company, Kenosha, Wis., who were in conference at the factory last week. These men will have charge of Jeffery distribution in the twenty-three districts into which the country has been divided

Dodge Bros. to Employ 10,000 in October

DETROIT, MICH., July 28—*Special Telegram*—Dodge Bros. will put about 10,000 men to work beginning October when a million dollar addition to the plant will be completed. This consists of a four-story assembly room, 1,000 feet long and 70 feet wide, and a press punching building. Machinery worth $300,000 will be installed. The total floor space will be 20 acres and will make it one of the largest factories in the country. A testing track in the shape of a racing circle of a quarter of a mile is being planned.

Col. Pope Can Sell Personal Property of Co.

HARTFORD, CONN., July 28—By agreement of the parties, Judge Marcus H. Holcomb of the superior court passed a substitute order today concerning the sale of a part of the Pope Mfg. Co. assets in Connecticut. The substitute order authorizes Colonel George Pope, the receiver in the Connecticut jurisdiction to sell at his discretion the personal property, not including cash or receivables, at prices not less than 70 per cent. of the inventory value in the smaller sales and no sale over $5,000 shall be less than inventory value without the approval of the superior court or a judge of that court.

The appeal of the Boston creditors' committee from the original order of Judge Holcomb allowing Receiver Pope to sell the property at his discretion as to prices, was withdrawn today and it is understood that about $40,000 worth of the machinery and material can be disposed of immediately. The court order allowing Receiver Pope to conduct the manufacturing business expires August 20 and the factory will close at that time.

Belgian Grand Prix for September 20

PARIS, July 21—By reason of a protest by the Automobile Club of the Sarthe, the Belgian Grand Prix has been postponed until September 20. There will be two races for respectively 4 1-2 liter machines as built for the French Grand Prix, and Tourist Trophy cars. In the Grand Prix section the entries are three Mercedes, four Peugeots, and a Delage entered by Arthur Duray. The Mercedes entry has been made by Pilette, Belgian agent for this firm.

In the Tourist Trophy section the entries are three Minerva, an Abadal, a Gregoire, and three Sunbeams. The Sunbeam entry appears to have been made by the Belgian agent for this firm, and it is very doubtful if the factory will confirm it.

Market Reports for the Week

There was a general reduction in prices this week in the markets. In the metal markets, tin and copper reduced their prices. Tin closed at $30.75 at a loss of $0.95 per 100 pounds. Electrolytic copper dropped $0.00 2-5 while Lake copper dropped $0.00 3-8 per pound. A further decline is anticipated. Sales thus far are light, as the future of the market depends upon developments in Europe. Lead was dull and unchanged. Pennsylvania petroleum dropped to $1.65 a barrel, a reduction of $0.05. Linseed oil rose $0.04, closing at $0.60, with a strong market. Up-river Para dropped $0.01, closing at $0.72.

Material	Wed.	Thurs.	Fri.	Sat.	Mon.	Tues.	Week's Changes
Antimony	.05¼	.05¼	.05¼	.05¼	.05¼	.05¼	.....
Beams & Channels, 100 lbs.	1.26	1.31	1.31	1.31	1.31	1.31	+.65
Bessemer Steel, ton	19.00	19.00	19.00	19.00	19.00	19.00	.....
Copper, Elec., lb.	.13⅜	.13⅜	.13⅜₁₀	.13¼	.13⅛	.13	—.00⅜
Copper, Lake, lb.	.13½	.13½	.13⅜₂₀	.13½	.13¼	.13⅛	—.00⅜
Cottonseed Oil, bbl.	7.23	7 19	6.86	6.79	6.90	6.90	—.33
Cyanide Potash, lb.	.17	.17	.17	.17	.17	.17	.....
Fish Oil, Menhadden, Brown	.40	.40	.40	.40	.40	.40	.....
Gasoline, Auto, bbl.	.14	.14	.13	.13	.13	.13	.....
Lard Oil, prime	.93	.93	.93	.93	.93	.95	+.02
Lead, 100 lbs.	3.90	3.90	3.90	3.90	3.87½	3.87½	—.02½
Linseed Oil	.56	.56	.56	.58	.58	.60	+.04
Open-Hearth Steel, ton	19.00	19.00	19.00	19.00	19.00	19.00	.....
Petroleum, bbl., Kans., crude	.75	.75	.75	.75	.75	.75	.....
Petroleum, bbl., Pa., crude	1.70	1.70	1.70	1.70	1.70	1.65	—.05
Rapeseed Oil, refined	.59	.59	.59	.59	.59	.59	.....
Rubber, Fine Up River, Para	.71	.71	.73	.73	.73	.72	—.01
Silk, raw, Ital	...	4.90	...	...	4.90	4.90	.....
Silk, raw, Japan	...	4.35	...	...	4.28	4.28	—.07
Sulphuric Acid, 60 Baume	90	.90	.90	.90	.90	.90	.....
Tin, 100 lb.	31.70	31.60	31.15	30.50	30.25	30.75	—.95
Tire Scrap	.04¾	.04¾	.04¾	.04¾	.04¾	.04¾	.....

Klaxon Brings Suit Against Newark Dealer

NEWARK, N. J., July 28—The Lovell-McConnell Mfg. Co., this city, maker of the Klaxon horn, has filed suit in the U. S. District Court in this city against the W. C. D. Motor Car Co., Lozier dealer; it is charged that the dealer infringes the original Klaxon patents, Nos. 923,048, 923,049 and 923,122, by using the Sparton horn as standard equipment. This is a different court district from those in which other Klaxon suits have been filed.

Studebaker Liabilities Shrink $2,216,000

NEW YORK CITY, July 29—Net earnings of the Studebaker Corp., for the 6 months ended June 31, after fixed charges, depreciation, etc., and before dividends, amounted to $3,027,844. The net earnings, on the same basis for the full year 1913, before dividends, amounted to $1,904,413.

The liabilities during the period have been reduced by $2,216,000. The cash on hand amounts to $3,228,000.

The net earnings after charges and depreciation of $3,027,844 reported by the Studebaker Corp. for the 6 months ended June 30, 1914 is equal to 9.2 per cent. on the common stock after deducting preferred dividends or at the rate of 18.4 per cent. for the year. This compares with 3.59 per cent. earned on the common stock for the year ended December 31, 1913.

Locomobile Co. Makes Statement of Condition

NEW YORK CITY, July 27—The Locomobile Co. of America, a corporation organized under the laws of West Virginia, reports the following statement of its condition on May 31, 1914:

Assets—	1914	1913
Real estate	$1,992,638	$1,924,092
Merchandise	3,872,342	3,696,751
Mfg. mdse., material and stock in process	911,447	..
Cash and debts receivable	..	1,038,979
Good-will, trade marks, patent rights	*5,305,892	4,986,460
Sundry	217,354	..
Total	$12,299,673	$11,646,291
Liabilities—		
Capital Stock	$6,250,800	$6,250,800
Accounts payable	293,228	512,463
Reserves	323,529	..
Funded indebtedness	2,186,070	1,460,504
Profit and loss surplus	906,046	749,425
Total	$12,299,673	$11,646,291

*Includes cash and debts receivable.

Iowa Spends $20,000,000 on Automobiles

DES MOINES, IA., July 25—Iowa bankers would like to depress the automobile business in Iowa "psychologically" or otherwise, according to leading Des Moines financiers who claim that the automobile industry has taken $20,000,000 out of Iowa this year.

"Whatever this psychological business depression is," says this banker, "I am convinced that the automobile industry is not suffering from it. I am sure that the automobile industry either has no nerves or is not of a skittish temperament.

"The amount of loans which Des Moines banks have outstanding is double what it was at this time last year. The automobile business is largely responsible for this condition. Farmers are buying automobiles faster than they can pay for them. They borrow money from the country banks on the prospects of enormous crops promised for this fall. The country banks borrow in turn from Des Moines banks.

"More than $20,000,000 already has been spent in Iowa for automobiles this year. The number of cars registered at the State House showed an increase of 25,000 over last year for the first six months of the year. The continued demand for money from the country banks indicates that the increase will be as great or greater for the last six months of the year.

"Nearly all this money is absolutely lost to Iowa. Not only does the actual cost of the automobiles go east but also a large share of the cost of maintenance. This is a heavy drain on the resources of the state. It would be well if the automobile business could be depressed for a time."

But Iowa distributors continue to report that they have only one trouble and that is to get cars enough to meet the demands from their territories.

—

Fuel Competition Brings Further Reductions

NEW YORK CITY, July 28—The Standard Oil Co. of New York has made a further reduction of a cent a gallon in the price of gasoline, largely as a result of competition. Both the Texas Co. and the Standard Oil are now quoting $.13 a gallon to the garages, in this city, Brooklyn and Long Island. The Gulf Refining Co. is still quoting $.14 for gasoline in this territory.

The price of gasoline has been reduced in St. Louis by the Standard Oil Co. to $0.10 2-5 a gallon, half a cent lower than it has been selling since the last previous cut. The gasoline price in East St. Louis, is a fraction of a cent higher than in St. Louis.

In New Jersey the gasoline war has culminated in a bench warrant being issued for the Standard Oil Co. of New Jersey, upon complaint of the Crew-Levick Oil Co., one of the several companies which have been engaged in that controversy. The price has been forced down to $.09 1-2 wholesale, in certain towns. The complaint charges that the Standard company is unreasonably cutting prices in an effort to wipe out smaller competitors.

Considerable surprise is being expressed as to the cause of the low price at which gasoline is being sold by some dealers in Rochester. Prices have been cut there from $.17 to $.12 1-2, $.13 and $.14 a gallon. The recent decline in the price of crude oil at the wells has much to do with the downward trend of prices for petroleum products.

Prices around Boston and Hartford have remained about the same. In Boston, gasoline is sold at $.14 with no indication of change. In Hartford the same price prevails, a reduction having been made last week from $.15.

—

Goodrich Half Year Profits $2,651,278

NEW YORK CITY, July 28—The following statement is made by the B. F. Goodrich Co., relative to earnings for the first half of 1914:

"The books of the B. F. Goodrich Co. were closed on July 1 for the purpose of determining the results of operations for the first 6 months of 1914. They have not been audited by public accountants, but the company's auditor has just submitted to the directors a statement of earnings for the period.

"After making proper allowances for maintenance, depreciation, bad debts and all known outstanding liabilities, etc., the net profits for the period amounted to approximately $2,651,278. This amount added to the surplus carried over December 31, 1913, shows undivided profits of approximately $2,307,261, after deducting the regular April and July dividends on the preferred stock.

"From this amount the company has appropriated an amount sufficient to retire $900,000 par value of preferred stock. The amount of quick assets over current liabilities shows a gain of approximately $1,628,508 for the period."

—

Automobile Securities Quotations

NEW YORK CITY, July 29—War indications in Europe affected the stock market considerably this week, and accentuated the weak tone of practically all the listed securities. The unlisted stocks were also affected and although there were a few gains in both listed and unlisted securities there were a greater number of losses while about 1-3 of the automobile and allied securities remained at the same quotations as last week. The tire companies made the strongest showing, Firestone common having gained 10 points while the preferred gained 1-2 point. Kelly-Springfield common gained 2 points and the first preferred 3 points. Goodyear common advanced 6 points while the preferred declined 2 1-2. There was no change in most of the car companies although Reo Motor Car gained 1 point while Reo Motor Truck lost 1-2 and Studebaker common showed a gain of 1-2 point on the common and a loss of 1-2 point on the preferred. Oil stocks were generally weak, Texas Co. losing 15 points while Vacuum lost 9.

	Wednesday		Thursday		Friday		Saturday		Monday		Tuesday		Week's	1913	
Security	Bid	Asked	Bid	Asked	Bid	Asked	Bid	Asked	Bid	Asked	Bid	Asked	Change	Bid	Asked
Ajax-Grieb Rubber Co. com	220	..	220	..	220	..	220	..	220	..	220	..	..	150	160
Ajax Grieb Rubber Co. pfd	99	..	99	..	99	..	99	..	98	..	98	..	—1	94	100
Aluminum Castings pfd	98	100	98	100	98	100	98	100	98	100	98	100	..	97	100
Case T. M. Co., J. I.	82¼	85¼	82¼	85¼	82¼	85¼	83	85¼	82	85	82	85	— ¼	..	..
Chalmers Motor Co. com	100	103	100	103	100	103	100	103	97	102	97	102	—3	..	112
Chalmers Motor Co. pfd	94	96	94	96	94	96	94	96	94	96	94	96	..	98	102
Electric Storage Battery Co	51	51½	50¾	51½	51½	..	51	51½	50	51	50	51	— ¾	..	..
Firestone Tire & Rubber Co. com	305	310	305	310	305	310	305	310	315	..	315	..	+10	280	282
Firestone Tire & Rubber Co. pfd	108	110	108	110	108	110	108	110	108½	110	108½	110	+ ½	103	104¼
Garford Co. pfd	75	85	75	85	75	85	75	85	75	85	75	85	..	92	96
General Motors Co. com	88	92	88	92	88	89¾	87	90	83	84	83	84	—7	30	32
General Motors Co. pfd	91	93	91	93	91	93	90¼	93	89	91	89	91	—2½	73½	77
B. F. Goodrich Co. com	24½	25	24⅛	24⅝	23¾	25	23¼	24	22½	23½	22½	23½	—1¼	30	31
B. F. Goodrich Co. pfd	88⅜	90	88⅜	90	88⅜	90	86	90	88	89	88	89	— ⅜	90½	92½
Goodyear Tire & Rubber Co. com	174	178	174	178	174	178	174	178	180	185	180	185	+6	298	302
Goodyear Tire & Rubber Co. pfd	97½	99	97½	99	97½	99	97½	99	98	100	95	100	—2½	99½	100¼
Gray & Davis Co. pfd	98	102½	98	102½	98	102½	98	102½	98	102½	98	102½	..	..	..
International Motor Co. com	..	3	..	3	..	3	..	3	..	3	..	3	..	3	5
International Motor Co. pfd	3	9	3	9	3	9	3	9	3	9	3	9	..	18	25
Kelly-Springfield Tire Co. com	51	53	51	53	54	55½	51	55	52	53	52	55	+2	..	..
Kelly-Springfield Tire Co. 1st pfd	70	80	75	80	73	75	74½	75	73	76	73	75½	+3	..	..
Kelly-Springfield Tire Co. 2d pfd	90	100	90	100	90	95	90	95	89	91	90	100	..	..	..
Lozier Motor Co. com	..	14	..	14	..	14	..	14	11	14	11	14	..	15	20
Lozier Motor Co. pfd	..	40	..	40	..	40	..	40	..	40	..	40	..	..	90
Maxwell Motor Co. com	14¼	14¾	14¼	14¾	14	15	13¾	14¼	13½	14½	12½	13½	—1¾	3¼	4
Maxwell Motor Co. 1st pfd	43½	45	44	45	43½	45	43¼	44	41½	43	39	40	—4½	28½	29½
Maxwell Motor Co. 2d pfd	17	19	17	19	18½	19	16	19	15	18	15	16	—2	8½	9¼
Miller Rubber Co	138	140	138	140	138	140	138	140	138	140	138	140	..	138	140
New Departure Mfg. Co. com	124	126	124	126	124	126	124	126	124	127	124	127	..	..	..
New Departure Mfg. Co. pfd	105	108	105	108	105	108	105	108	105	108	105	108	..	..	..
Packard Motor Co. com	103	112	103	112	103	112	103	112	..	112	..	112	..	..	..
Packard Motor Co. pfd	97	100	97	100	97	100	97	100	97	..	97	..	..	95	102
Peerless Motor Co. com	10	17	10	17	10	17	10	17	10	17	10	17	..	30	40
Peerless Motor Co. pfd	..	50	..	50	..	50	..	50	..	50	..	50	..	85	92
Pope Mfg. Co. com	..	1	..	1	..	1	..	1	..	1	..	1	..	10	11
Pope Mfg. Co. pfd	..	3	..	3	..	3	..	3	½	2	½	2	..	28	33
Portage Rubber Co. com	..	30	..	30	..	30	..	30	..	30	..	30	..	35	42
Portage Rubber Co. pfd	..	90	..	90	..	90	..	90	..	40	..	40	..	..	90
*Reo Motor Truck Co	11½	12½	11½	12½	11½	12½	11½	12½	12	13	12	13	— ½	9	10
*Reo Motor Car Co	19	20½	19	20½	19	20½	19	20½	20	21½	20	21½	+1	18	19
Rubber Goods Mfg. Co. pfd	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Russell Motor Co. com	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Russell Motor Co. pfd	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Splitdorf Electric Co. pfd	40	50	40	50	40	50	40	50	40	50	40	50	..	..	..
Stewart Warner Speedometer Corp. com	51	52	51	52	51	52	51	52	..	48½	..	48½	..	..	..
Stewart Warner Speedometer Corp. pfd	99	101	99	101	99	101	99	101	99	101	99	101	..	..	..
Studebaker Co. com	31½	32	32½	33	32	32¾	32	32¾	30	31	30	31	+ ½	23	24
Studebaker Co. pfd	83	86	82½	86	82½	86	81	85	82	83	82	83	— ½	81	86
Swinehart Tire & Rubber Co	85	87	85	87	85	87	85	87	85	86	85	86	..	82	92
Texas Company	136	136½	135¼	136	134	135	134	135	130	13[illegible]	120	121	—15	..	..
U. S. Rubber Co. com	57	57¾	56⅝	57⅝	56⅜	56¾	56	56½	56	56½	56	56½	..	60¼	60¾
U. S. Rubber Co. 1st pfd.	101¼	101½	101¼	102	101¼	101¾	100⅞	101¾	100	101	100	101	— ½	104	104½
Vacuum Oil Co	216	219	216	217	210	214	211	215	208	212	207	209	—9	..	..
White Co. pfd	107	110	107	110	107	110	107	110	107	110	107	110	..	104	108
Willys-Overland Co. com	88½	89½	88	88½	87½	88½	86½	87½	85	87	85	85	—4¾	50	60
Willys-Overland Co. pfd	93½	95	93	95	93	95	93	95	92	95	92	94½	—1½	85	90

*The par value of these stocks is $10; all others $100.

No Criminal Responsibility if Car Is Unmanageable

When a Part Becomes Deranged and Affects the Control, Driver Cannot Be Prosecuted for Accidents

WILMINGTON, DEL., July 27—Through the discharge from custody of Nathan H. Hutchins, who was arrested after a motor car he was driving had run down a child on the sidewalk, badly injuring her, the local authorities have made it plain that drivers of motor cars cannot be held criminally responsible for injuries sustained through accidents over which they have no control.

A car Hutchins was driving jumped onto the sidewalk last Friday, knocking down and running over Rosie Sammono, 9 years old, after which the police arrested him, charging reckless driving. It was found that the accident was due to a part on the machine becoming disarranged, causing it to become unmanageable, and when Hutchins was arraigned in the City Court on Saturday, Prosecuting Attorney John F. Lynn entered a nolle prosequi. The child is expected to recover. She is in the Delaware Hospital.

Form Club for New York Motor Tradesmen

NEW YORK CITY, July 27—For the purpose of providing a social organization for the motor tradesmen of New York City, the Motor Club, Inc., has been formed and has taken possession of the rooms at 222 West 59th street, formerly occupied by the now defunct Manhattan Automobile Club. A restaurant, bar, billiard rooms, library and other essential club adjuncts are provided and members are admitted upon payment of an annual fee of $20.

Aside from its social features the organization plans to use its influence in legislative matters. Dances, entertainments and club runs are planned.

F. S. Toback was elected president of the club at a meeting held on July 28. The other officers are: P. J. McShane, vice-president; W. C. Poertner, second vice-president; J. P. Nichols, treasurer and E. F. Korbel, secretary.

U. S. L. Receivers File $100,000 Bond

BUFFALO, N. Y., July 29—J. O. Moore and J. A. Roberts, receivers of the United States Light & Heating Co., have filed a joint bond of $100,000. Judge Hazel appointed Moore and Roberts to the receivership on July 23. On that day, Louis S. Posner, council for the company, filed an answer to the action of the Central Trust Co. of New York, with a $[illegible]0,000 claim, admitting all the allegations it contained and consenting to the receivership. The company is capitalized at $17,000,000.

The equity action of the trust company will be tried at a later date here in the Federal court.

Judge Hazel ordered the answer of A. H. Ackerman, vice-president of the U. S. Light & Heating Co., in which he admitted fraud and mismanagement on the part of the board of directors of the company and consented to the appointment of a receivership, be stricken out.

Bosch Demonstrates Its New Lighting System

NEW YORK CITY, July 23—A practical demonstration of its new lighting system was conducted by the Bosch Co. last night in the presence of representatives of the technical press. A Marmon car, which make is the first to be equipped with complete Bosch electrification was run over roads in the neighborhood of Fort Lee, under a variety of conditions. One purpose of the demonstration was to show the advantages which the company claims for its new design of head lamp. This lamp differs from the ordinary type in that instead of producing a long pencil ray the light is distributed more evenly about the entire width of the road in front of the car. This effect is obtained partly by the reflector, which is not strictly parabolic, but chiefly by the use of a special lamp, the filament of which is not concentrated in a focal point as is commonly the case but is spread over a comparatively large flat area.

The lamp is interesting from another point. A new standard lamp base has been adopted by the Bosch Co. as in its opinion the old bayonet type is inadequate. Two sizes have been standardized and all lamps and plug connections conform to one or the other. The new socket is also a bayonet design but by the use of flat surfaces instead of pins for holding the base in the socket a much steadier arrangement results.

To show the ample generating power of the dynamo and the adequacy of the Bosch carbon-pile method of regulation the car was run through a large range of speeds with the battery cut out. Above a certain easy running speed the light from the lamps was remarkably steady.

The installation on the Marmon includes the Bosch-Rushmore starting motor which showed itself well able to handle the six-cylinder motor.

FREMONT, OHIO, July 27—At the annual meeting of the stockholders of the Lauth-Juergens Motor Car Co., Fremont, O., the following were elected directors: J. W. Worst, A. E. Culbert, H. H. Weinhart, J. W. Forsythe, W. A. Lucas, Theodore Juergens and L. C. Worst.

Offers $6,500 for Cameron Co. Assets

HARTFORD, CONN., July 28—E. S. Cameron in the bankruptcy court in New Haven has just made an offer of $6,500 for the assets of the Cameron Automobile Co., of West Haven, which recently went into bankruptcy. The purpose of the hearing before Referee Carleton E. Hoadley was also to decide whether or not the referee could re-open the case and authorize J. Birney Tuttle, an attorney who was appointed trustee, to accept an offer of $17,500 for the assets which was made later. Counsel for the interested parties argued the case which was continued until August 4.

Efficiency Survey Discusses Car Units

CHICAGO, ILL., July 23—At a meeting of the board of technical detail of the American Efficiency Survey of Motor Car Units, held at the Chicago Automobile Club last night, eight units were passed upon and many of the present units in test discussed. The meeting was the result of the efforts of President Harry Newman, who, knowing that the members would be in Chicago, arranged a dinner at the Automobile Club, and there discussed and passed upon various units. Of the seventy-three units to be tested the following ten have already been completed: Spark plugs, magnetos, tires, oil, ignition cable, jacks, hand pumps, power pumps, tow line and brake lining.

The American Efficiency Survey of Motor Car Units, using the testing laboratories of Purdue University, is an organization founded for the purpose of testing all the parts which go to make up a motor car and publishing the reports of these tests in the form of a bulletin. The tests continue through day and night for perhaps many months and engineers in the laboratory are said to take readings every 30 seconds throughout the entire testing period. In other words, after a test by the survey, it is expected that the device will have shown all its characteristics and a report can be given out telling its value with relation to similar devices and just how it acted under varied conditions. A report on the units just passed upon will be issued in 2 or 3 weeks, it is stated. At present tests of motors, carbureters and speedometers are being conducted.

The board which considers the passing or rejection of units is composed of the following Purdue men: C. H. Benjamin, dean of the engineering schools; Prof. Louis E. Endsley, G. A. Young, M. J. Golden, C. F. Harding and R. G. Pilkington, resident engineer.

R-C-H and Hupp-Yeats Assets Bring $100,000

DETROIT, MICH., July 25—At the bankruptcy sale of real estate, machinery, equipment, pattern drawings, repair parts of the R-C-H Corporation and of the Hupp-Yeats Electric Car Co., Detroit, a total of about $100,000 was realized.

Walpole Creditors to Receive 4 Per Cent. Dividend

BOSTON, MASS., July 28—Judge Dodge, in the U. S. District Court, ordered another dividend of 4 per cent. to be paid to the creditors of the Walpole Tire & Rubber Co. $50,000 has been set aside for this purpose. This makes $171,000 thus far paid out.

ALPENA, MICH., July 27—The Besser Mfg. Co., a foundry, bid $5,200 for the plant of the bankrupt Alpena Motor Car Co., and it is probable that the sale will be confirmed by the referee in bankruptcy and the other parties interested. All told, the sale amounted to $6,200.

Speed without Negligence Not an Element of Manslaughter

Driver Who Failed to Slow Down to State Limit Not Held for Michigan Killing

LANSING, MICH., July 25—The supreme court of the state of Michigan, in a decision rendered today, held that the accidental killing of a person by an automobile, even when the car is exceeding the state speed limit, is not manslaughter unless culpable negligence has been proven.

The case concerns Wm. J. Barnes of Lansing, who accidentally ran down a girl in May, 1911, the victim dying in consequence of the accident. Barnes was convicted by the Ingham County Circuit Court, Judge Wiest of that court holding that inasmuch as the state law requires automobilists to slow down to ten miles an hour when approaching pedestrians that Barnes had failed to slow down his car, thus causing the accident. It was shown in the testimony that the girl in her excitement jumped in front of the car.

The supreme court held that Barnes could not be held guilty of manslaughter unless culpable negligence was shown.

Injunction in Twitchell Gauge Case

NEW YORK CITY, July 27—In the case of A. Schrader's Son, Inc., against the 35 Per Cent. Automobile Supply Co., alleging infringement of the Twitchell tire gauge, the plaintiff brought a motion for preliminary injunction on July 20 and July 22 the order for a preliminary injunction was issued *pendente lite*. The motion was not contested by the defendant, whose counsel, Lucius E. Varney, states that the company is not infringing the complainant's rights.

Four Missouri Counties Have No Cars

ST. LOUIS, MO., July 3—For the first 6 months of this year 46,143 automobiles were registered with the secretary of state according to figures made public by the official today. Of this number 10,680 are in the city of St. Louis which has 4,883 more cars registered than has Kansas City, whose citizens have placed 5,797 cars on the books. Jasper county led the counties with 1,465 and was followed by Buchannan with 1,331 while St. Louis county—St. Louis city not included—was third with 1,306. Four counties—Carter, Douglas, Ozark and Reynolds—have no registrations while Shannon and Taney counties have but two each.

During the six months licenses were issued to 5,207 chauffeurs and 849 dealers secured permits to do business in Missouri. The motorcycle registry showed 2,920 power bikes.

The money collected from the registration and applied to the good roads fund was $201,866.50.

Two septuagenarians were among the drivers licensed, one being seventy-one years old and the other a year older.

Minnesota Registrations, 56,634

MINNEAPOLIS, MINN., The state automobile directory issued July 1 places the total registration of automobiles in the state at 53,599 cars. Since then the number has gone to 56,634. The book is issued by Roscoe B. Anderson, Security Bank Building, the head of the Automobile Trail Blazing Assn. The book has outline maps to show the routes in the Northwest that are already blazed, fifteen in all. Monthly sheets will be issued to keep the book up to date. The registration for each car is good for 3 years, so the book starts back in 1912 when the new law was passed.

New Jersey Licenses Exceed 1913 by 9,000

TRENTON, N. J., July 17—During the first 6 months of the present year the State Department of Motor Vehicles has collected $668,393, or $6,947 more than the total sum collected during the entire year of 1913.

Comparison between the first 6 months of last year and this year shows that last year there were 40,394 registrations issued, as against 49,567 this year. The increase in registrations is therefore 9,173.

The number of drivers' licenses taken out this year shows an increase of 10,627 over the corresponding period last year. The licenses taken out this year amount to 55,532, while last year, for the same period, they were 44,905. Fines collected up to June 30, 1913, amounted to $4,716, while in 1914 they totaled $9,004.

Motors of Steel Now Made in Berlin

(*Continued from page* 225)

Steel is the material used wherever possible. It is very thin in the cover and the waterjacket. Even the valve chamber covers are made of light steel pieces. The intake conduits are built into the cylinder block and the space gained by the thin material admits of giving them a very uniform sectional area throughout their length. The exhaust pipe is a curved steel tube with walls from 1.5 to 2 millimeters thick. The cylinders are of a special steel and machined inside and outside, while the valve guides are turned from castings and pressed into the respective steel sleeves forming parts of the block. A special process, not disclosed, is followed in producing the joints of cylinders with waterjackets, of the jackets with their upper covers and of the valve boxes with the intake pipes.

A special design feature is that the cooling-water when it enters the cylinders is first led under the exhaust valve chambers before it can rise. For this purpose the apertures are provided which may be seen in the plan view below the section of the induction pipe.

A steel bedplate with bolt holes connects the lower cylinder ends and serves for the securing of the block to the crankcase and to increase the stability of the whole.

With regard to the exterior appearance of these and other steel motors of this manufacture a remarkable smoothness in lines and joints is a striking feature. The block shows no seams but, with its flanges and the exhaust pipe, appears as machined all over.

The weight, as compared with the lightest cast cylinders, is about one-third, but it is considered a greater advantage that the thin walls admit of a very effective water-cooling which in turn admits of increased compression and a much enhanced thermic efficiency of the motor. Another advantage is that almost any requirement of the designer with regard to shapes, the dimensions of conduits and the thickness of walls can be executed with great accuracy in the pressed-steel parts, so that no compromises, possibly affecting the operation, need to be made.

The question of price depends largely on the quantity of production. For small orders it comes relatively high, but in the case of mass production it can be made equal to or even lower than that for ordinary motors. The manufacture is already on a practical basis through its connections with large German automobile builders who will employ the products.—From *Der Motorwagen*, July 10.

Reading Torsion Dynamometers

AN improved method for taking optical readings from torsion dynamometers is described and illustrated by Volkmar Vieweg in *Zeitschrift des Vereines Deutscher Ingenieure* for June 20. It depends upon the use of a system of lenses which revolve with the dynamometer, the axis of the system being parallel with the shaft of rotation, and in whose focal plane are arranged the scale and the index to be observed. The advantages consist in the simplicity of the arrangement and in the sharpness and strong illumination of the images. It was originated at the Physico-Technical Government Institution at Charlottenburg.

Big Economy-Reliability Run for Wisconsin

Four Trophies in 3-Day, 472 Mile Tour — Special Economy Rules — Dealers Bid for Pathfinding

MILWAUKEE, WIS., July 27—Final arrangements just completed for the fourth annual Wisconsin State Automobile Assn. tour indicate that the run will be the most important held in America this year and may surpass in importance the best Glidden ever run. The tour will be an economy-reliability run, conducted under grade 1 rules of the A. A. A., with supplementary rules governing the economy part of it. The dates definitely selected are September 2, 3 and 4, and the route is 472 miles long. The contestants will fight for four trophies, the well-known $1,000 Sentinel cup, which is a sweepstakes trophy; a trophy just offered by *The Milwaukee Free Press*, for best road score; the new cup hung up by the *Wisconsin Motorist* for the winner of the economy division of the test, and the Emil Schandein cup, for private owners, which has been competed for three times in connection with the annual W. S. A. A. tours.

It is expected that there will be a considerable entry list from Milwaukee and Wisconsin dealers for the three trophies, and at least four or five private owners for the Schandein mug. There has been no state tour since 1912, the 1913 tour having been abandoned because of the lack of stock car registrations with the A. A. A. contest board. The 1914 tour was abandoned also, but revived as a combination economy-reliability run upon the demand of dealers for a stimulant to trade, which the runs have always been in the past.

The route will be as follows:

Wednesday, September 2—Milwaukee to Sheboygan, Manitowoc, Kewaunee, Algoma and Green Bay, Wis., 164.8 miles.

Thursday, September 3—Green Bay to Oshkosh, Fond du Lac, Beaver Dam and Madison, Wis., 147.6 miles.

Friday, September 4—Madison to Janesville, Beloit, Burlington, Kenosha, Racine and Milwaukee, 159.9 miles.

The pathfinder will be sent out with M. C. Moore as trail blazer about August 5. Dealers are now bidding for the honor of furnishing the pathfinding car and have until August 1 to quote the best figure.

George A. West, Wisconsin representative on the A. A. A. contest board, and treasurer of the W. S. A. A., who has handled all previous Wisconsin tours, will again act as referee.

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31 Cars in Colorado Prize Parade

DENVER, COL., July 24—An evening parade of beautifully decorated and illuminated motor cars was one of the most attractive features of the Grand Lodge Golden Jubilee Session and Reunion of Elks, held in Denver last week. Thirty-one cars from Colorado and one from Utah competed for the $700 cash prizes and the fifteen special prizes of automobile accessories, watches, etc.

Visitors from Los Angeles, New Orleans and other cities making much of motor events of this kind pronounced the decorative and illuminative effects among the most artistic they had ever seen. The parade was in charge of the Denver Motor Club.

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Fourteen Entries for Elgin Races

CHICAGO, ILL., July 28—The fourteenth Elgin entry is a specially built car nominated by Frederick Robinson, a theatrical man who has engaged Mort. Roberts to drive it. The car is called the Pahys, a Greek word meaning quick.

Billy Chandler in the Braender Bulldog and F. H. Dearborn in a third Stutz are late declarations for the races of August 21-22. All the cars are in both days, which makes a total of twenty-six nominations for the 2 days.

As the list now stands, the field is made up as follows: E. J. Schroeder's Peugeot, driver not named; Stutz, Oldfield; Stutz, Anderson; Sunbeam, Grant; Sunbeam, Babcock; Marmon, Heinemann; Marmon, driver not named; Mercedes, De Palma; Peugeot, Burman; Braender Bulldog, Chandler; Duesenberg, Rickenbacher; Duesenberg, driver not named.

Babcock, however, will not be found at the wheel of the Sunbeam because of an accident Sunday night at the course. Following a trip around the circuit, Babcock stopped at his camp. Getting ready to start again, his arm was broken in two places by the back kick of his motor. Babcock is in a serious condition and there is some fear of amputation. So far no new driver has been named.

Cy Patschke, who was to have driven Erbstein's Marmon, has been withdrawn because Mrs. Patschke objects to his driving. Erbstein now is trying to get either Howard Wilcox or Ralph Mulford.

Ray Harroun was at the course Saturday and engaged the camp for the Maxwell team which has not been entered as yet but which is surely coming. Harroun states that Moross will enter five cars. In addition to the three Maxwells there will be d'Alene's Marmon and Brock's Wright, which formerly was known as the Ray.

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Mercer, Metz and National Star at Springfield

SPRINGFIELD, MASS., July 25—Fully 10,000 persons witnessed the amateur automobile races held this afternoon at Imperial Park.

The National, Metz and Mercer cars were the winners in the twelve events held.

One of the most interesting races of the day was when the small Metz stock runabout, driven by Barrett, competed with a Mercer, driven by Brainard. The Metz was given a handicap of 100 yards, and the little car stuck to it and won the 2-mile race in 3:07 2-5.

The 3-mile race between the National, Mercer and Knox cars started with the Mercer leading, but the National being pushed hard passed it shortly, and holding the pace came in first. The Mercer lost on the curves.

The Mercer driven by Laviolette broke the track record for 1 mile, when it negotiated the distance in 1:24 1-4. The former record was 1:27. This car also won the 3-mile flying start race, beating out Brainard's Mercer. Its time was 4:13 4-5.

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Tetzlaff Breaks Washington Mile Record

SEATTLE, WASH., July 18—Tetzlaff, driving a Benz car, broke the state of Washington record for 1 mile at the Meadows track near this city on July 18, his time being 54 1-2 seconds. Cooper in his Stutz succeeded in capturing three of the four principal races of the day, while Klein appropriated the most hotly contested race of the day with his King.

On the second day's racing Tetzlaff succeeded in breaking his record of the day previous when his Benz made the distance in 53 2-5 seconds.

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A $500,000 Speedway for Minneapolis

MINNEAPOLIS, MINN., July 27—Capitalists have put underway a plan to build a two-mile brick motor speedway within a short distance of the city limits of Minneapolis to cost $500,000, and to be ready by the fall of 1915. J. D. Hogan and William D. Hogan, land men, and closely associated with other capital, are back of the plan, and Orin Kellogg is connected with the enterprise which will be put on a bond or stock selling basis. After studying four different sections of the surrounding country of the Twin Cities, the Hogans have obtained a half section of land in Anoka county, within reach of the street car lines, not far from railroad lines and on the boulevard system of Hennepin and Ramsey counties, thus bringing both Minneapolis and St. Paul in close touch by automobile roads as well as traction lines. Little excavation work is necessary as the land is level. Large grandstands will be erected.

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Car-Nation Covers 3,500 Miles in 8 Days

PHILADELPHIA, PA., July 27—A practical demonstration of the economy and endurance of the small car was concluded yesterday in Atlantic City by the Atlantic States Sales Co., local distributor of the Car-Nation. The Car-Nation selected for the test made six trips daily between the company's headquarters in North Broad street, this city, to Atlantic City, N. J., from July 17 to 26, inclusive.

The total distance covered by the car is approximately 3,500 miles in the 8 days.

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Sealed Hupmobile Finishes 6,200 Miles

DETROIT, MICH., July 22—After having previously covered about 4,500 miles with its hood, battery box and starting crank handle sealed, a Hupmobile driven by Fred Perkins arrived in this city from Baton Rouge, La., having made the journey of 1,700 miles in 84 hours 28 minutes at a total operating expense of $29.22, or $0.017 per mile.

Perkins, who came with his wife and little daughter, was the bearer of a letter from the mayor of his home city to Mayor Marx, of Detroit. The executive and a party of city officials found the seals as Mayor A. Grouchy, Jr., of the Louisiana city had appended them.

Mr. Perkins had the hood of his Hupmobile sealed last January as the result of a wager which he made with friends who claimed he could not travel 2,000 miles over the roads of his home state with the car thus sealed. Not only did Perkins win his wager, but he continued the demonstration, and now has covered over 6,000 miles.

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SAN FRANCISCO, CAL., July 25—Twenty-five thousand automobiles, the largest number of cars ever brought together at one time in the United States, took part in the fifty-mile parade in San Francisco July 15, which was named Automobile Day.

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Two Herff-Brooks Cars for 1915

INDIANAPOLIS, IND., July 28—The Herff-Brooks Corp. line for 1915 will consist of a 50-horsepower, six-cylinder car with a bore of 4 and a stroke of 4 1-2 inches, and a 40-horsepower, four-cylinder car with 4 1-2-inch bore and 5-inch stroke, the cylinders in both motors being of the L-head type cast singly. The six-cylinder, five-passenger touring car, equipped with the Aplco electric system, sells for $1,375 and the four-cylinder, five-passenger car with the same equipment sells for $1,100. The equipment includes, beside the lighting and starting system, a one-man top. Bosch magneto, Stromberg carbureter, disappearing type of steering wheel, which permits of easy access to car from the front, new type of radiator, ventilated engine hood, Turkish upholstery and auxiliary seats in the touring cars. The cars are left drive with center control and are manufactured in both two- and five-passenger types.

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Boston To Philadelphia in an Electric

BOSTON, MASS., July 28—A Detroit roadster recently completed a run from this city to Philadelphia, averaging 25.4 miles per hour. The trip was made in an elapsed time of 33 hours and 50 minutes, although the actual running time between the city limits was but 12 hours and 57 minutes.

The trip was undertaken to demonstrate the adaptability of the ordinary electric automobile for touring purposes, when suitable battery and tire equipment are installed; also the feasibility of boosting lead batteries efficiently and expediently. The car was equipped with Goodrich Silvertown Cord tires and was driven by R. L. Heberling, Philadelphia sales manager of the Philadelphia Storage Battery Co. The motive power was furnished by a 44-cell Philadelphia thin plate diamond grid storage battery.

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300-Meter Hillclimb Record Is Broken

BOULOGNE-SUR-MER, July 22—Camille Jenatzy's 4-year old record for the 300 meters hill climb was broken in the first day of the Boulogne meeting. With a car having a piston displacement of 1,342 cubic inches, the late Belgian champion climbed the 328-yard hill, having a gradient of 14 per cent., with a standing start, 15 4-5 seconds. One of the Grand Prix Peugeots, built under the 274.6 cubic inch rule, cut this record to 14 3-5 seconds. This is at the rate of a little more than 47 miles an hour. Hispano-Suiza took second and third place in the racing car section with respectively 16 3-5 and 19 4-5 seconds.

In the touring car class a 30 h.p. Panhard-Levassor, Knight motor, made the best performance with 17 seconds. The car carried four passengers. Second place in this division was secured by a Hispano-Suiza in 18 seconds, followed by an Aquila-Italiana in 19 seconds. In the touring car section for cars competing for the Crespelle Cup, which embodies a series of varied tests, a four-cylinder 85 by 130 mm. Darracq made the best performance in 22 2-5 seconds. It was followed home by a Gregoire in 25 seconds, with a Hupmobile third in 27 1-5 seconds.

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Wisconsin Registrations Pass 45,000 Mark

MADISON, WIS., July 27—Wisconsin motor car registrations passed the 45,000 mark on June 26. There seems to be no question that the total registry for 1914 will exceed the 50,000 mark. At the close of business on June 26 the figures were: private owners registered, 45,016 and the dealers, 1,160.

The total registration for 1913 was 34,646, and the 1914 list therefore shows a gain of nearly 30 per cent. on June 26, or to be exact, 29.9 per cent. The total revenue from all registrations is in excess of a quarter of a million dollars. At $5 each, 45,016 private owners' licenses amount to $225,080; 1,160 dealers' licenses at $10 make $11,600, and 6,748 motorcycle licenses at $2 figure $13,496, for a total of $250,176.

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Lincoln Way Route Not To Be Changed

DETROIT, MICH., July 29—*Special Telegram*—Henry B. Joy, president of the Lincoln Highway Assn. sent the following reply to President Wilson, who some time ago asked the association to have the Lincoln Highway include Washington and Baltimore on its route:

"Your letter addressed to me as president of the Lincoln Highway Association under date of June 19, was duly received and duly acknowledged. In that letter you suggested that the Lincoln Highway Association give its consent to the placing of the official Lincoln Highway markers along a route from Philadelphia to Baltimore, thence to Washington, thence to Frederick, thence to Gettysburg, thus re-routing the Lincoln highway via these cities and increasing the length of route by 17 miles between New York and San Francisco.

"I have delayed replying to your letter for many reasons, among them: First, of course, on account of the seriousness of the request as coming from you, the president, you who have so loyally supported the Lincoln memorial highway project and who sent to our association your check among the very first in support of this great and good enterprise. Second, to ascertain the attitude of the counties and cities lying between Philadelphia and Gettysburg and from which the Lincoln Highway would be diverted by the change in route you suggest. Third, to fully again review and reconsider the purpose and plan so carefuly originally adopted by our association after elaborate investigation and consideration. I am under the necessity of stating to you that the work of the Lincoln Highway Association, no doubt greatly assisted through your recognition of its work in its early stages, has progressed so favorably that there scarcely remains along the entire Lincoln way any section of its route which has not been marked and to a very great extent re-named. Especially is such the case between Philadelphia and Gettysburg, where in the counties traversed, and also in the cites of York, Lancaster, Coatesville, Columbia, Downingtown, etc., the official adoption by the local authorities of the name Lincoln way and the marking thereof and the betterments and beautification in process make the changing of the route in accordance with your suggestion, if for no other reasons, outside of and beyond the control of this association.

"The Lincoln Highway Association has committed and entrusted the Lincoln way to all the people and especially to the states, counties, villages and cities through which its route extends. It is not possible to undo the wonderful work of the communities whose loyal patriotic efforts are making, have indeed made the Lincoln Highway a part of the map of our country and whose plans for its improvement are being effectively carried forward according to the financial means and energies of these communities traversed, and the aid our association is able to extend the Lincoln way is the shortest, most direct and practicable route consistent with the topography of the country from New York on the Atlantic to San Francisco on the Pacific, and to change from that basic principle and extend its length by devious windings from city to city, or from point of interest to point of interest, would insure its failure as a permanent useful memorial way."

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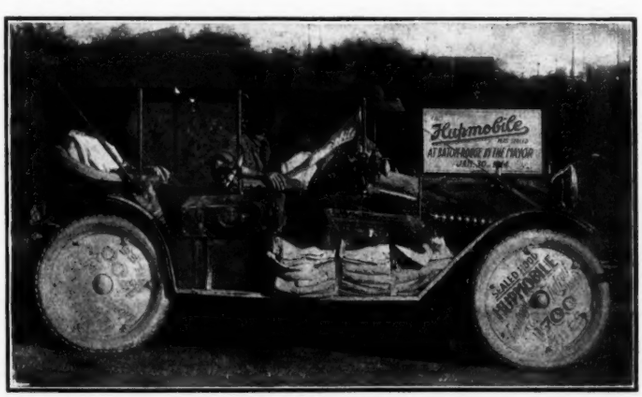
Booster Outing for September 17

NEW YORK CITY, July 29—The Village Boosters outing will be held on September 17 down on Fred Wagner's farm. The usual games will be participated in. There will also be a clambake.



Hupmobile, whose bonnet has been sealed since January

Factory Miscellany

MILWAUKEE'S Working Force Increases—Figures compiled by the retail merchants' division of the Merchants and Manufacturers' Assn., Milwaukee, Wis., show that there has been an increase of 5 per cent. in the number of workmen employed by Milwaukee metal-working shops of all kinds in 30 days. The general average of manufacturing plants is 80 per cent. of normal, while machine shops are operating 65 to 70 per cent. of normal. Retail sales show a large increase over the corresponding period of 1913, while cash sales are larger in volume and collections on credit sales are much improved.

Harrold Tool Adds—The H. J. Harrold Tool Co., Salem, O., manufacturer of all kinds of tools, automobile springs a specialty, will enlarge its plant and build an office.

Miller to Build Parts Plant—C. F. Miller, of Defiance, O,, will erect a factory in Bryan, O., for the purpose of manufacturing automobile parts in addition to other products.

Will Reorganize Star Rubber—Stockholders of the Star Rubber Co., Akron, O., have decided to reorganize the company for the purpose of freeing the concern from a heavy indebtedness. A new organization will purchase and operate the plant.

Cole Service Bldg. in Plant—Since the completion of a new factory building the Cole Motor Car Co. has moved its service station and general offices from North Capitol avenue to its factory in East Washington street, Indianapolis. The company now has all of its offices and departments at the same place.

Packard and Ford Plants Closed—The plant of the Ford Motor Co., Detroit, is closed since July 22, and will not reopen until August 3, when the work of taking the annual inventory will be completed. The Packard Motor Car Co. will close its plant July 27 and remain closed during one week or less, for the same reason.

Oil Co. Buys Plant—The Winona Oil Co., Winona, Wis., has purchased the branch office, warehouse system, etc., of the Valvoline Oil Co. at Eau Claire, Wis., and will establish a tank wagon service covering Eau Claire, Chippewa Falls and surrounding territory. This is the fourth branch plant established by the Winona company.

Maxwell-Newcastle Plant Working—After a shut-down of 2 weeks, the plant of the Maxwell-Newcastle Mfg. Co., Newcastle, Ind., has resumed operations. About 1,000 men are now employed and the force is to be further increased. The company manufactures parts for cars formerly manufactured by the United Motors Co.

Miller Rubber Increases—The Miller Rubber Co., Akron, O., has planned to expand to a large degree, following the increasing of the capital stock from $1,000,000 to $2,000,000. The buildings, formerly occupied by the Franz Body Works, will be used to increase the capacity at once. Other large additions are contemplated.

Fisher Body Adds—A five-story building located at Forrest and Grandy avenues, Detroit, Mich., has been acquired by the Fisher Closed Body Co. and the Fisher Body Co., which are both under the same management. This will give the concerns about 100,000 square feet of additional floor space and enable them to employ about 600 more men.

Universal Adds More Men—The Universal Mfg. Co., Racine, Wis., which is making a compressed-air cranking device for motor cars, has been obliged to increase its shop facilities and add more men to take care of orders for the appliance. A special device is made for Ford cars and the demand from this source has swamped the concern.

Xenia Rubber Decides on Plant—At a meeting of the officers and stockholders of the Xenia Rubber Co., of Xenia, O., it was decided to locate the company's new plant in Xenia, and the purchase of a site on North Detroit street was authorized. Roy Bickett, manager of the company, states that the directors have decided to construct a two-story building, 50 by 100 feet, concrete and steel, sides constructed of steel and glass.

Dunkirk Plant Sold—L. A. Pease, referee in bankruptcy, July 18 confirmed the sale of the plant of the Motor and Mfg. Works Co., Dunkirk, N. Y., to E. K. Buttolph, of Dunkirk, for $3,500, subject to a judgment lien of $5,200. David Reid, former head of the company, following the sale to Buttolph declared he could secure a buyer at an advanced figure over the one bid by Mr. Buttolph, and Referee Pease postponed his report, but Reid failed to appear as he suggested July 16 at the creditors' meeting, and immediately the sale to Buttolph was confirmed. The company will be reorganized and the operation of the plant continued.

Parish & Bingham Adds—With the preparations for erecting a big power plant to adjoin the main building at Madison avenue and West One Hundred and Sixth street, the Parish & Bingham Co., Cleveland, O., maker of automobile frames, has under way an imposing construction unit. The main building, costing $140.000, and the office building, costing $25,000, will be ready for occupancy in two months. The main building is of the monitor type, 900 feet long. It is a model daylight factory and enclosed in glass. The present location of the Parish & Bingham Co. is on Hamilton avenue, near East Fifty-fifth street. The factory makes frames for Ford cars.

The Automobile Calendar

July-August	French Army Truck Subsidy Trials.
Aug. 1-3	Galveston, Tex., Beach Races.
Aug. 2-9	Grenoble, Automobile Club of France's 6-Day Motorcycle and Cyclecar Reliability Contest in French Alps.
Aug. 16	Le Mans, France, Automobile Club de la Sarthe's Coupé International Light-Car Race, 1 liter, 400 maximum cylinder area, 350-500 kilos weight.
Aug. 17	Le Mans, France, Auto Club de la Sarthe's Grand Prize de France for 4½ liter cars.
Aug. 21-22	Chicago, Ill., Elgin Road Races, Chicago Automobile Club.
Aug. 23	Auvergne, France, Coupé de l'Auto Race.
Aug. 27	Brooklands Track, England; Annual Automobile Race.
Aug.	Denver, Colo., 650-mile Run, Colorado Springs to Salt Lake City.
Aug.	Russia, Road Race, Coupe de l'Empereur, 2,500 miles.
Sept. 6-7	Brescia, Italy, Auto Club of Italy's 4½-liter Grand Prize.
Sept. 6-7-8	Newark, N. J., Cyclecar Reliability Tour to Atlantic City.
Sept. 7-14	Indianapolis, Ind., Automobile Show, Indianapolis Automobile Trade Assn.
Sept. 9	Corona, Cal., Road Race, Corona Auto Assn.
Sept. 10	Portsmouth, Eng., Autumn Conference, Institute of Metals.
Sept. 10-15	Berlin, Germany, German 4½-liter race.
Sept. 15-Oct. 11	New York City, Commercial Tercentenary Celebration.
Sept. 26	Brooklands Track, England, Annual Automobile Race.
Sept. 26-Oct. 6	Berlin, Germany, Automobile Show.
Oct.	Philadelphia, Pa., E. V. A. A. Annual Convention.
Oct. 4	St. Louis, Mo., Automobile Show, Auto Manufacturers' and Dealers' Assn.
Oct. 7-17	New York City Electric Vehicle Show, Grand Central Palace.
Oct. 9-Nov. 2	S. A. E. European Trip.
Oct. 16-26	Paris, France, Automobile Salon.
Oct. 17-24	Pittsburgh, Pa., Automobile Show, Auto Dealers Assn., Inc.
Oct. 19, 20, 21	Philadelphia, Pa., Elec. Veh. Assn.'s Convention.
Oct. 19-26	Atlanta, Ga., American Road Congress of the American Highway Assn. and the A. A. A.
Oct. 28-31	Milwaukee, Wis., Convention, Northwestern Road Congress, Auditorium.
Nov.	El Paso, Tex., Phoenix Road Race, El Paso Auto Club.
Nov. 6-14	London, England; Olympia Show.
Nov. 8-9	El Paso to Phoenix, Ariz., Automobile Race.
Nov. 8-11	Shreveport, La., Track Meet, Shreveport Auto Club.
Nov. 15	Paris, France, Kerosene Motor Competition.
Jan. 2-9	New York City, Annual Automobile Show, Grand Central Palace.
Jan. 23-30	Chicago, Ill., Automobile Show, First Regiment Armory.

The Week in the Industry

Motor Men in New Roles

SILLS Chevrolet Sales Manager—W. C. Sills, who has been in charge of the Boston branch of the Chevrolet Motor Co., New York City, has been appointed general sales manager of that company, with headquarters in that city.

Fisher Off for Europe—Carl G. Fisher, president of the Indianapolis Speedway, sailed for Europe on the *Imperator* on July 25.

Reese Goodyear Manager—Woodson Reese has been appointed manager of the local branch of the Goodyear Tire & Rubber Co., Philadelphia, Pa.

Vogler Maxwell Sales Manager—H. J. Vogler has been made district sales manager for the Philadelphia (Pa.) territory of the Maxwell Motor Co., Detroit, Mich.

Connects With Wagenhals Co.—The former automobile editor of La Presse, a Montreal newspaper, W. Robinson, has become identified with the Wagenhals Motor Car Co., Detroit.

Barnes Joins Federal Truck—L. I. Barnes has joined the sales organization of the Federal Motor Truck Co., Detroit, Mich., and will have charge of the sales development movement in the South.

Hook with Mercer—R. C. Hook has just joined the sales force of the Mercer Automobile Co., Trenton, N. J. Prior to his Mercer connection Mr. Hook was associated with the Motor Shop of Trenton.

Atkinson Resigns—Robert Atkinson, who has been associated with many of the prominent automobile firms in the Northwest, and recently manager of the Hudson agency in Seattle, has severed his connection with that company.

Capt. Gray Resigns—Capt. W. H. Gray, who has been manager of the Northwest Auto Co. in Portland, Ore., for the past 2 years, has resigned. He will take several weeks vacation before entering the automobile business again.

Bloomfield Monarch Representative—The Monarch Motor Car Co., Detroit, Mich., has appointed William Bloomfield as a special representative for the states of Alabama, Louisiana and Mississippi, with headquarters in Birmingham, Ala.

Case Joins Paige-Detroit—Julian Case, formerly manager of the advertising departments of the Regal Motor Car Co., Detroit, Mich., and the Abbott Motor Car Co., is now with the advertising department of the Paige-Detroit Motor Car Co., Detroit.

Jordan Back in Boston—George N. Jordan has returned to Boston, Mass., again to take a position as assistant manager of the wholesale branch of the Studebaker Corp. under Henry Myers. He will travel through New England for the company.

Voorhis Joins Oakland—C. B. Voorhis has resigned his position as assistant general manager of the Kingman Plow Co., of Peoria, Ill., and becomes assistant sales manager of the Oakland Motor Co., Pontiac, Mich., under F. W. Warner, general sales manager.

Changes in Indianapolis—Will H. Brown and Sam Renick have taken over the interests of E. Beveridge Dill in the United Supply and Accessory Co., Indianapolis. Mr. Dill retires as president and general manager, but Grant Newby will retain his interest in the company.

Blossom Sails for Europe—C. W. Blossom, of The Grant-Lees Gear Co., Cleveland, O., sailed on the S. S. *Caronia* from Boston on Tuesday, July 14, to investigate European manufacture of silent chains. He will spend considerable time at the Coventry silent chain factory in Coventry.

Wood Heads Abbott's Detroit Branch—The Abbott Motor Car Co., Detroit, Mich., has opened a new branch in Detroit, at 467 Woodward avenue. L. E. Wood, sales manager of the company, has charge of the branch, while O. A. Schreiber, who has been with the concern for many years, is assistant to Mr. Wood.

Chandler Factory Representative Mondex Absorber—W. R. Chandler has been appointed factory representative of the A. & J. Mfg. Co., Binghamton, N. Y., which has just completed negotiations for the exclusive manufacturing of the new Mondex shock absorbers. He has opened offices in the U. S. Tire Bldg., New York City.

Holton Monarch Sales Manager—Hoover Holton, formerly general sales manager of the Empire Automobile Co., and of the American Motors Co., Indianapolis, Ind., has been appointed general sales manager of the Monarch Motor Car Co., Detroit, which is making a four-cylinder car listed at $1,000 and a six-cylinder car costing $1,400.

Kaufman Sailing for Europe—Carl Kaufman, general manager and treasurer of The Motor Car Equipment Co., New York City, accompanied by his wife and daughter, will sail for England the first week in August. Mr. Kaufman will look into the development of the motor accessory line abroad and attend the automobile shows in Berlin and Paris.

Moore Gets Boost—E. A. Moore, production manager of the Fairbanks-Morse Mfg. Co., Beloit, Wis., has been appointed general manager of the gas engine department to succeed F. E. Greene, who resigned recently. Mr. Moore is an internal combustion engineer and has been associated with the Fairbanks-Morse and other engine builders for many years.

Baker Heads Franklin Service Dept.—E. L. Baker has been appointed head of the service department of the H. H. Franklin Mfg. Co., Syracuse, N. Y., to succeed Ralph Murphy, who is now chief engineer. Mr. Baker has been connected with the Franklin engineering department several years and for the past year and a half has been resident engineer on the Pacific Coast.

Daniels May Build Light Car—It is reported in Detroit, Mich., that a new concern to manufacture a light car is now being formed by George E. Daniels, formerly vice-president and general manager of the Oakland Motor Car Co., Pontiac, Mich.; Howard Bauer, former assistant sales manager of this company, and J. H. Newmark, former advertising manager of the same concern.

Roberts Joins Oakland—R. K. Roberts, of San Francisco, Cal., has been named assistant general sales manager of the Oakland Motor Car Co., and will be given entire charge of the Oakland business on the Pacific Coast, embracing California, Oregon, Washington, Idaho, Nevada, Utah, British Columbia and the Hawaiian Islands. Mr. Roberts was formerly identified with the management of the Howard Automobile Co. in California.

Bowen Heads New S. G. V. Agency—The agency for S. G. V. cars for the Metropolitan district was transferred last week to the Whitefield Motor Car Co., New York City. This new concern will succeed the Gotham Motor Car Co. The Whitefield company will be located at 242 West Fifty-ninth street. F. H. Bowen is general manager. The directors of the new company are A. L. Corey, M. J. O'Brien, Jr., D. W. Wilworth, Seth B. French, H. W. Carhart and F. H. Bowen.

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Garage and Dealers' Field

Michel Advertising Co. Moves—A. Eugene Michel, advertising agent, New York City, has changed his address in Chicago, Ill., from the Rookery to 225 East Twenty-second street.

Will Handle Timken Axle Parts—Jos. C. Gorey & Co., 354 West Fiftieth street, New York City, will handle a complete line of parts for Timken front and rear axles from 1907-1915 types on and after August 1, 1914.

Adopt Westinghouse System—The Westinghouse Electric & Mfg. Co., of East Pittsburgh, Pa., announces that the Singer Motor Co., Inc., Long Island City, N. Y., has adopted the Westinghouse electric starting and lighting system for its 1915 cars. This equipment consists of starting motor and lighting generator with the complete equipment of switches, fuse blocks and voltmeters. This company also announces the adoption by the American La France Fire Engine Co., Elmira, N. Y., of the Westinghouse electric automobile equipment for fire trucks manufactured by this company.

Buick Dealer Uses Tent—H. E. Pence, of the Pence Automobile Co., Minneapolis, Minn., distributor of Buick cars in the Northwest, last week started out a tent exhibit of the new Buick models to make all the state and county fairs of importance in the territory. The tent is 40 by 80 feet. Except at Huron, S. D., and Helena, Mont., where Mr. Pence will be personally, local dealers will handle the big exhibit. The first stop was at Grand Forks, N. D., July 28. The Pence company contracted for 390 Buick 1915 models with dealers the first day the exhibit was made in the Pence showrooms, Hennepin avenue and Eighth street.

Recent Incorporations in the Automobile Field

AUTOMOBILES AND PARTS

Indiana

INDIANAPOLIS—Metal Auto Parts Co.; capital, $50,000; to manufacture metal parts of automobiles, etc. Incorporators: B. E. Thompson, W. B. Austed, G. H. Scott.

MUNCIE—M. C. M. Motor Co.; capital, $10,000; to manufacture automobiles. Incorporators: W. M. Mathews, Luther Cobb, E. L. Morris.

Kentucky

COVINGTON—United States Motor Truck Co.; capital, $250,000. Incorporators: R. C. Stewart, B. Bramlage, M. H. McLean.

New York

NEW YORK CITY—Remington Motor Sales Co.; capital, $150,000; to deal in automobiles. Incorporators: Philo E. Remington, 30 Church St.; Carl W. Bliss, E. M. Kolstad.

NEW YORK CITY—Universal Advertising Autocar Co.; capital, $25,000. Incorporators: Antonio DeGiorgio, 107 Broad St.; Giulio J. Lusardi, Guiseppe Manara.

ROCHESTER—Pritchard-Lyon Motor Co.; capital, $25,000; to manufacture automobiles. Incorporators: Curtis B. Lyon, 47 Flower City Park; Paulina Pritchard, Albert R. Pritchard.

Ohio

CLEVELAND—Kelley Sales Co.; capital, $10,000; to deal in automobiles and parts. Incorporators: E. R. Cross, L. W. Kelley, F. T. Beaumont, D. V. Fisher, L. H. Luff.

CLEVELAND—Patterson Auto Carriage Co.; capital, $10,000; to deal in automobiles and accessories. Incorporators: Edna May Patterson, L. M. Westropp, R. J. Mariarity, C. C. McMohon, H. C. Patterson.

TOLEDO—Paige-Toledo Co.; capital, $20,000; to deal in all kinds of motor vehicles. Incorporators: C. L. Sturtevant, J. G. Eppens, H. D. Davis, F. Hofer, Jr.; C. L. Clapp.

PAINESVILLE—Vulcan Carriage Co.; capital, $1,000,000; to manufacture and deal in automobiles and other vehicles.

Pennsylvania

PITTSBURG—Pittsburg Motor Car Co.; capital, $100,000; to manufacture automobiles and all kinds of motors. Incorporators: J. M. Frere, H. J. Davis, G. Shearer.

GARAGES AND ACCESSORIES

Connecticut

STAMFORD—Enterprise Tire Shop; capital, $5,000; Incorporators: Claude L. Frost, Rupert C. King, John M. Carl, Harry J. Bond.

Indiana

SOUTH BEND—League Tire Co.; capital, $250,000; to deal in tires. Incorporators: W. P. Furcy, R. J. Miller, M. Brung.

Kentucky

LOUISVILLE—Electric Garage Co.; capital, $25,000. Incorporators: George Bader, Frank S. Ouerbacker, J. Woodford Button.

Michigan

ADRIAN—Adrian Carburetor Co.; capital, $50,000; to deal in carburetors.

DETROIT—Wallace Shock Absorber Co.; capital, $5,000; to deal in shock absorbers. Incorporators: John E. Wallace, William J. Wallace, George C. McDonald.

New York

BROOKLYN—Rutledge Garage; capital, $10,000. Incorporators: Blanche V. Foulks, James E. Foulks, Jr., 1324 Dean St.; Oliver N. Sarvant.

NEW YORK CITY—Vehicle-Safeguard Instrument Co.; capital, $25,000; to manufacture safety devices for automobiles, etc. Incorporators: Junius A. Howe, 1269 Broadway; Frieda G. Howe, Junius J. Howe.

Ohio

CLEVELAND—Cuyahoga Tire & Supply Co.; capital, $10,000; to deal in tires and other automobile supplies. Incorporators: Louis Abrams, M. M. Gleichman, M. B. Abrams, M. Eckstein, N. B. Gordon.

CLEVELAND—General Rubber Goods Co.; capital, $50,000; to deal in all kinds of rubber goods. Incorporators: Griswold Wilson, L. H. Wallace, W. L. Hassenmueller, William G. Stuber, G. C. Sheidler.

TOLEDO—Wight Mfg. Co.; capital, $20,000; to manufacture automobile supplies. Incorporators: A. V. Wight, A. C. Faulkner, George Sace, Edward Scanlon, F. E. Calkins.

Oklahoma

CUSHING—New State Refining Co.; capital, $25,000; to deal in gasoline. Incorporators: T. J. Hughes, R. C. Jones, J. R. Travis, all of Cushing, and C. H. Travis, Coffeyville, Okla.

OKLAHOMA CITY—Emma Gasoline Co.; capital, $6,000; to deal in gasoline. Incorporators: W. A. Ledbetter, C. E. Franke, J. H. Gauthier, all of Oklahoma City.

Canada

TORONTO—Canadian Storage Battery Co.; capital, $40,000; to manufacture storage batteries.

CHANGE OF NAME AND CAPITAL

Ohio

AKRON—Miller Rubber Co.; capital increased from $1,000,000 to $2,000,000.

Automobile Agencies Recently Established

PASSENGER CARS

Alabama

Florence	Maxwell	McRae Motor Car Co.
Russellville	Maxwell	Chas. R. Wilson

Arizona

Phoenix	Jeffery	McArthur Bros.

California

Sisson	Maxwell	P. H. Miller

Connecticut

Hartford	Regal	D. I. Strong

Georgia

Vidalia	Maxwell	C. C. Thaxton

Iowa

Clarinda	Maxwell	Night & Day Garage
Sac City	Franklin	D. E. Hallett

Idaho

Hailey	Maxwell	Hailey Garage Co.
Shoshone	Maxwell	Helman & Helman

Illinois

Cerro Gordo	Maxwell	C. W. Adams & Co.
Robinson	Westcott	O. H. Wheeler

Indiana

Bowling Green	Maxwell	K. X. Frump
Centerville	Maxwell	Jos. M. Zea
Indianapolis	Westcott	Sears Auto Repair Shop
New Albany	Saxon	W. W. Humbert

Kansas

Aulne	Maxwell	Aulne Auto Co.

Kentucky

Ashland	Saxon	Wright Motor Car Co.
Beaver Dam	Saxon	M. D. Hudson Automobile Co.
Brandenburg	Ford	McIntire & Applegate
Carrollton	Saxon	J. G. Howe
Central City	Ford	Barnes Automobile Co.
Cynthfield	Saxon	Bryant McMurtry
Frankfort	Saxon	Nicols Bros.
Harrodsburg	Saxon	Ingram's Garage
Henderson	Saxon	J. V. Gasser
Hitchins	Saxon	Clayton S. Hitchins
Leitchfield	Saxon	Paul Meridith
Lexington	McFarland	McFarland Six Sales Co.
Lexington	Overland	S. E. Drake
Lexington	Paige	Bluegrass Auto Co.
Lexington	Saxon	A. W. T Davis
Louisville	Partin-Palmer	Louisville Automobile Exchange
Louisville	Vulcan	J. A. Viglini
Owensboro	Saxon	J. R. Beck
Paducah	Saxon	C. N. Baker
Poole	Saxon	Crowley & Nelson

Massachusetts

Boston	Partin-Palmer	Hudson-Dolan
Collins	Franklin	J. C. Penn

Michigan

Grand Rapids	Briscoe	Wealthy Heights Gar.

Missouri

Greenfield	Maxwell	M. L. Young
Kansas City	Howard	Young Motor Co.
Kansas City	Lexington	Young Motor Co.
Kansas City	Partin-Palmer	Standard Motor & Mfg Co.
Kansas City	Vulcan	Vulcan Motor Co.
Ozark	Maxwell	J. H. Gardner & P. R. Waggoner

Nebraska

Danbury	Maxwell	J. W. Nutt

New Jersey

Mendham	Westcott	Freeman Bros.
Red Bank	Westcott	Fred Van Doren
West Hoboken	Westcott	Decker & Keynton

New York

Brooklyn	Westcott	Remson Auto Co.
Nyack	Westcott	D. D. Kessler
Ogdensburg	Franklin	Lytle & Murton

Ohio

Circleville	Allen	G. L. Schiear
Circleville	Cadillac	G. L. Schiear
Circleville	Hupmobile	G. L. Schiear
Columbus	Patterson	Gean DeWitt
Waterford	Ford	Pickering & Roberts

Ontario

London	Franklin	London Engine Sup. Co., Ltd.
Port Arthur	Franklin	D. Boureau

Oregon

Heppner	Maxwell	N. E. Winnard
Portland	Briscoe	Francis & Kadderly
Portland	Jeffery	F. C. Riggs Co.

Pennsylvania

Bethlehem	Westcott	O. C. Snyder

Quebec

Montreal	Crow	Sevigny & Lalonde
Montreal	Moon	Sevigny & Lalonde

Tennessee

Nashville	Chandler	Capital Garage
Nashville	Saxon	Dixie Motor Car Co.
Nashville	Stutz	Stutz Motor Car Co.

Texas

Burton	Maxwell	Chas. Kasten

Washington

South Bend	Maxwell	Soule & Round

Wisconsin

Hurley	Franklin	Twin City Iron Wks.
Iola	Franklin	Swanson Bros.

COMMERCIAL VEHICLES

Maine

Bangor	Koehler	S. L. Crosberry

Missouri

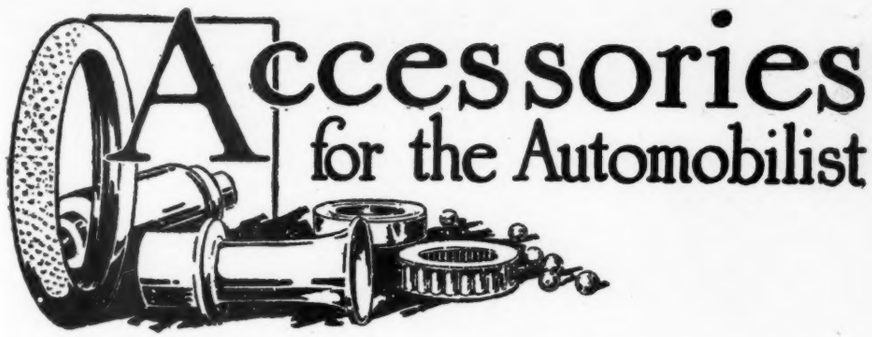
Kansas City	Republic	Republic Motor Sales Co.

New Jersey

Hightstown	Koehler	Thos. Peppler & Son
Whitehouse	Koehler	Burdette Bros.
Athens	Koehler	F. E. Goldsberry

Pennsylvania

West Newton	Koehler	McKennery & Britton



UNIVERSAL Annular Ball Bearings—The Schatz Mfg. Co., Poughkeepsie, N. Y., is offering a new type of annular ball bearing, Fig. 1, designed to meet the demands of the manufacturer of cyclecars and small automobiles, also for the needs of the accessory manufacturer. This bearing is known in the trade as the Universal.

The bearing is made with a solid steel cone, pressed steel cup rings and a soft steel outer jacket, which grips and holds the cup rings rigidly in place. The ends of the soft steel jacket are turned in in an angular position, as shown, against the cup rings, thereby reinforcing the cup rings and also giving a finish to the completed bearing.

These bearings are made from high-grade materials throughout. The cone and cup rings are carefully hardened and tempered and are guaranteed to carry the same load as standard bearings. Particular attention is called to the fact that although this bearing has all the advantages of an annular ball bearing, its construction is such that 70 per cent. radial thrust is obtained. Furthermore, it is claimed in this construction there is a three-point contact, making it practically impossible to break a ball under the most severe conditions. Owing to the fact that the universal is an annular bearing and positively non-adjustable, the assembling is less expensive than in other types. The manufacturer claims that this one feature alone makes the bearing particularly desirous in wheel construction. In this design the ball race in the cone and the O. D. dimensions only are ground, but the bore and other dimensions are kept within commercial limits. The bearings are made in standard sizes.

K-W Road Smoother—Several changes from the model announced at the first of the year are noted in the helical spring shock absorber which is manufactured by the K-W Ignition Co., Cleveland, O., and which is known as the K-W Road Smoother.

These shock absorbers, Fig. 2, are designed to be attached to the spring ends, replacing the shackles, both front and rear. There are several interesting features in the new model. First of which is an anti-rebound air chamber at the top which, it is said, effectually prevents the rebound of the spring. Then the anti-side motion links prevent side rocking and swaying when turning corners. The air piston is provided with an automatic lubricating pad and there is a dust shield enclosing the bottom of the mechanism. The springs are manufactured from electric-smelted chrome vanadium steel and phosphor bronze bushings are used throughout.

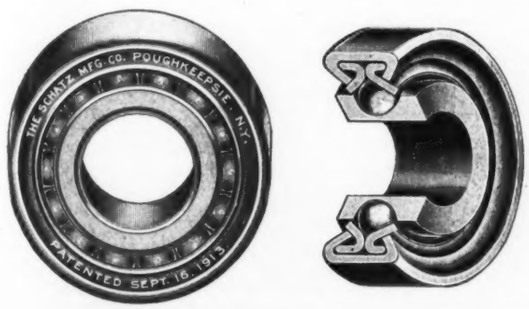


Fig. 1—Two views of the Universal annular ball bearings

Bigger Rubber Preservative—A process by which it is stated that new rubber can be made to last for many years and by which the old rubber may be rejuvenated is offered by the Bigger Rubber Preservative Co., Inc., Buffalo, N. Y.

It is well known that rubber loses its life comparatively quickly because the chemicals needed to put it into the various forms for commercial uses, in time, cause it to disintegrate. But it is claimed that by proper chemical treatment that this chemical action can be prevented.

S. V. Truck Tire—A new pressed-on type of solid truck tire known as the improved S. V. has just been announced by the Goodyear Tire & Rubber Co. The feature of this tire is that there are no accessories needed, such as bands, keys, side flanges or bolts and there is no left or right side. The tread is flat, the base of corrugated channel section and more rubber is now used than previously. The weight of the tire now is less than the weight of the ordinary type with accessories, it is claimed.

Canvas Tread Tires—A rubberized canvas tire which is claimed to be exceedingly strong and immune to punctures, blowouts, etc., has been brought out by the Canvas Tread Tire Co., New York. The tire consists of 13 layers of rubberized canvas vulcanized together with an extra ply of rubber between each ply of canvas. The bead is of fiber. The maker claims unusual wearing qualities for this construction and adds that it shows excellent non-skid qualities. The prices range from $24.95 for the 30 by 3½-inch size to $60.60 for the 37 by 5-inch.

Polo Tire Alarm—A new model tire alarm, known as No. 14, has been introduced by the Polo Tire Alarm Co., Great Northern Bldg., Chicago, Ill. This alarm is intended to be screwed into place on the valve, replaces the ordinary cap and is so adjusted that should the pressure drop below the required amount a shrill and continuous alarm gives warning that the tire needs attention. A set of four costs $6, complete.

National Bar Spring—An unusual form of front spring is that shown in Fig. 3, in which a solid bar takes the place of the usual half-elliptic. This bar is pivoted to the frame at the front, and is supported at the rear by a scroll spring fastened to the frame. The axle is attached near the front of the bar so that the long end of the bar is supported by the spring and thus a lighter spring can be used.

It is stated that the shock or jolt occasioned by the wheels passing over uneven surfaces is transmitted in a line indicated by the arrow, and is automatically cushioned. When obstacles are encountered, the wheel momentarily stops, due to the fact that the operation of the bar swinging from its pivotal connection performs its function of receiving and transmitting shocks to the springs in a quicker time, thus permitting the wheel to pass over the obstruction without that sudden shock or jolt. After the car has passed over the obstruction, the action of the spring forces the bars into the normal position and prevents the vibration which always accompanies a shock when the car body is suspended upon the spring supports of the ordinary type.

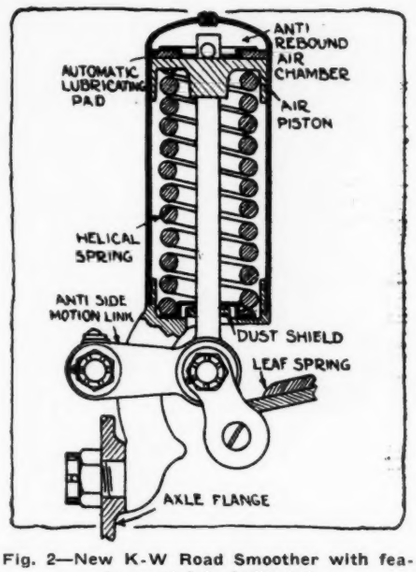


Fig. 2—New K-W Road Smoother with features plainly indicated

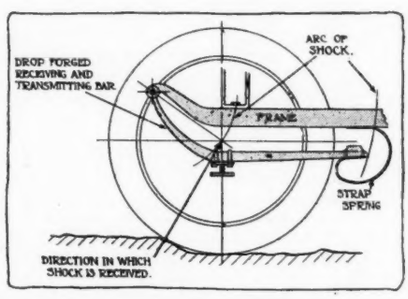


Fig. 3—National bar spring, in which a solid bar with a scroll spring at one end is used

Staon Tire Gauges—The Advance Specialty Co., Shinola Bldg., Rochester, N. Y., has recently brought out an im-

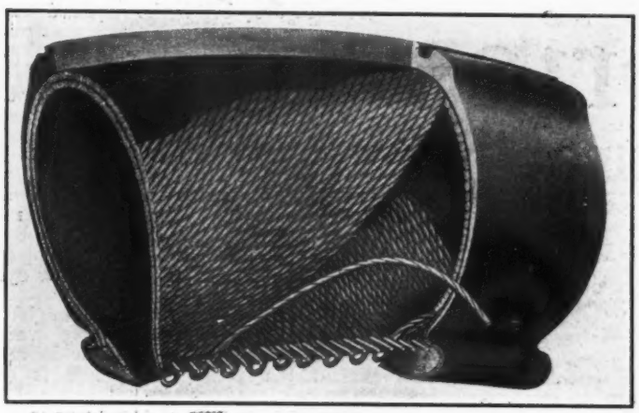


Fig. 4—Phantom view of Goodrich Silvertown Cord tire

proved form of tire gauge. A shut-off valve which is operated by the cover hinge pin in such a way that air enters the gauge tube only when the cover is open. When it is closed there is no pressure in the gauge tube and the pointer stands at zero. Because of this feature the gauge mechanism is relieved of continuous strain. The cost of a set of four gauges is $6, and the gauges are intended to remain in position except when the tires are being changed.

Goodrich Silvertown Cord Tire—There are many interesting features in the Cord tread tire recently brought out by the B. F. Goodrich Co., Akron, O. It is claimed that with the use of these tires that the 15 per cent. more horsepower is available for the propulsion of the car. In other words, this much more of the engine power is available because these tires offer less road resistance. This saving is due to the increased flexibility and resiliency of the cord construction. Looking at this feature from another angle—with the same gasoline consumption greater loads can be carried. It is said, that on a car that developed 15 horsepower at a certain speed, 800 pounds extra were carried without increasing the consumption of fuel. Also with the same load, the fuel consumption is reduced about 25 per cent. on the average, it is stated.

The increased resilience gives additional speed and makes the work of guiding the car much easier. Owing to the equality of tension in the cable cords, cars equipped with Silvertowns will coast much farther than cars with ordinary tires, it is stated.

Fifty per cent. reserve strength is claimed for these tires and also that the tires are immune from stone bruises. The cord construction and even tension make the Silvertowns extremely resilient. On hitting a stone the casing flexes easily and the shock is not felt on the inner body as in the old types.

It will be noted in Fig. 4, the cord tire, as its name implies, has a fabric made up of cotton cords or cables instead of a canvas cloth. The carcass of the tire is made up of a number of individual, long fiber cotton threads thoroughly impregnated with rubber under high pressure; these threads are then woven into a cord which is also impregnated with rubber. The finished cord is then woven over a form, in two layers, each layer of cord being separated by a layer of rubber. Every part of the cord is made and wound into the tire under an equal tension by specially designed automatic machinery in such a manner that all the internal strains are conveyed throughout, with no slack threads or overworked parts. Every part of the tire carries its share of the load and all parts work together as a unit it is stated.

An interesting test to show the relative merits of the two types of tires was recently made by the Goodrich company on a hill on South Main street, Akron, O. The car, a six-cylinder Peerless, was allowed to coast down this hill, equipped, first with ordinary canvas fabric tires, and then with Cord tires. The average grade was about 2 per cent. and the hill was 2,297 feet in length. Beginning with a standing start, no power being used, at the first .1-mile the speed of the car with fabric tires was 9 miles per hour and with Cord tires was 14; at the .2-mile these respective figures were 11.5 and 17; at the .3-mile, 11 and 17; at the .4-mile 8.5 and 16.5; and about 200 feet beyond this mark the car when fitted with ordinary tires stopped. At this same point the car, when equipped with Cord tires was running 13.5 miles per hour, and continued for 546 feet when it stopped on a slight up grade.

Double Spark Plug—In order to produce two sparks in the same cylinder at the same time the Power & Efficiency Co., Trenton, N. J., has brought out a double spark plug, shown in Fig. 5. This plug when connected with an ordinary plug causes the current to go to the gaps of both plugs and thus two sparks occur, thereby increasing flame propagation and hence power. The insulator is shaped to form a double V, the sides of the larger V being slightly concave and the smaller V being in the center and ending in a sharp point. This construction is said to cause the points to be cleaned by the gas. The insulator is carried to a point very near the spark gap in order to prevent any short circuit to the shell of the plug. The keeper B may be used to carry the current to ground after it has jumped the gap, and in this way the action is the same as an ordinary plug. By removing the keeper and attaching a wire in its place, the other end of the wire connecting with an ordinary plug, each plug will fire. The plug sells for $1.

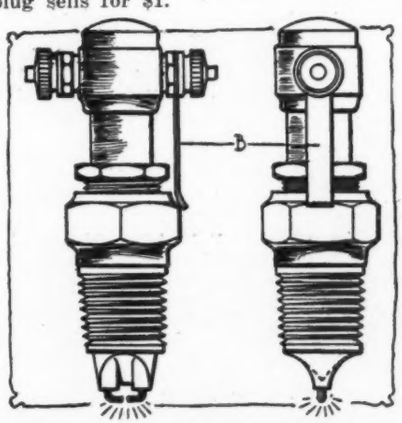


Fig. 5—Two views of Double spark plug

Ideal Gas Lighter—A simple device, Fig. 6, for lighting and controlling the acetylene lights from the dash has been brought out by the Ideal Brass Works, Indianapolis, Ind. It is easily installed, consisting merely of a gas regulating and controlling valve on the dash and some simple electric wiring to produce sparks at the burners when the gas is turned on.

An ordinary gas tank is used, a high-pressure gas tube running from the tank to the control valve on the dash. From here the gas passes to the regulating valve to the lamps, the same as in any system. Along side of the control handle is a small push button that is operated when the sparks are to be produced. Connected into the back of this switch is a lead running from the high-tension circuit. Closing the switch

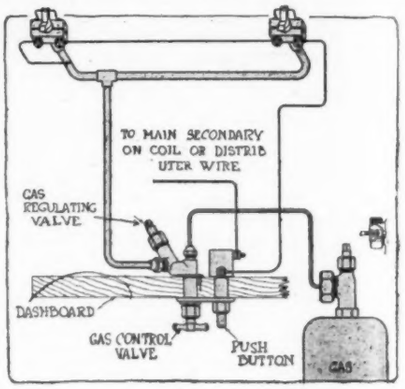


Fig. 6—Ideal gas lighter for acetylene systems

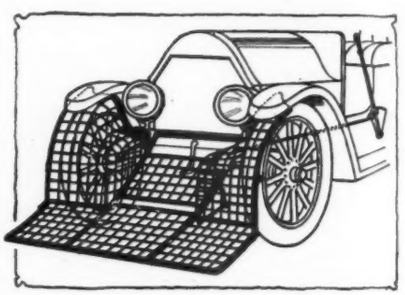


Fig. 7—The Standard fender, which may be raised or lowered from seat, depending on road conditions

causes the current to flow between the spark gaps at the burners, and thus the lamps are lighted.

The Standard Fender—An interesting invention that has recently been put upon the market is the Standard fender, Fig. 7. It is designed to protect pedestrians from being run over, by motor vehicles, and trucks especially, and yet not interfere with maneuvering of the machine or its progress under varying road conditions.

The Standard fender is easily manipulated by the driver by a lever which allows him to raise the fender slightly when traveling over rough roads, or a full movement of the lever folds the fender up. The fender when lowered in position is 2.5 inches from the ground.

Standard fenders are constructed for all sizes and styles of machines and are built from channel and angle steel, which is latticed and securely riveted. Every bolt is fastened with a lock washer.